Univ. of
Toronto
Library

Biol
N

THE NAUTILUS

A MONTHLY JOURNAL
DEVOTED TO THE INTERESTS OF
CONCHOLOGISTS

VOL. XXII.

MAY, 1908, to APRIL, 1909.

149569
17/4/19

EDITORS AND PUBLISHERS:

H. A. PILSBRY, Curator of the Department of Mollusca, Academy of Natural Sciences, PHILADELPHIA.

C. W. JOHNSON, Curator of the Boston Society of Natural History, BOSTON.

QL
401
N25
V.22-23

INDEX

TO

THE NAUTILUS, VOL. XXII.

INDEX TO SUBJECTS, GENERA AND SPECIES.

Acharax Dall, n. gen. of Solemya 2
Achatinellidæ, Description of new species of . . . 67
Acteon pompilius var. multannulatus Aldr., n. var. (Pl. V, fig. 11) 76
Alabama, A week at Claiborne 98
Alcadia pusilla intermedia Pils., n. var. 96
Amnicolidæ from Alabama 85
Ampulla Bolten, Type of 83
Ancey, C. F. (obituary, portrait) 11
Andrews, Mrs. George (obituary) 60
Arca (Barbatia) lignitifera Aldr. (Pl. V, figs. 6, 7) . . 75
Ashmunella kochii Clapp, n. sp. (Pl. VIII, fig. 1–3) . . 77
Bifidaria armifera Say 52, 108, 110
Bifidaria bilamellata Sterki & Clapp, n. sp. (Pl. VIII, fig. 7). 126
Bifidaria (Chænaxis) tuba intuscostata Clapp, n. sub. sp. (Pl. VII) 76, 96
Bifidaria clappi Sterki, n. sp. (Pl. VIII, fig. 4) . . . 108
Bittium hiloense Pils. & Van., n. sp. (fig. 1) . . . 56
Brachiopods, Some new 28
Cæcum johnsoni Winkley, n. sp. 54
Californian Mollusks, Miscellaneous notes on . . . 37
Cancellaria ? sotoensis Aldr., (Pl. V, fig. 3) . . . 74
Chloritis tosanus okiensis Pils. & Hir. 44
Clappia clappi Walker, n. sp. (Pl. VI, figs. 1, 4, 7) . . 89

Clappia, n. gen. 89
Corbula clarksana Ald., n. sp. (Pl. V, figs. 4, 5) . . 74
Cœlocentrum hinkleyi Pils., n. sp. 138
Cœlocentrum ischnostele Pils., n. sp. 139
Coryphella mananensis Stimp. 15
Cratena gymnota (Couth.) 15
Cuban notes 3
Cypræa annettæ Dall, n. n. 125
Cypræa californiana Gray 126
Cypræa caputdraconis Nielv. 126
Cypræa costispunctata Gask. 126
Cypræa gracilis, Notes on 10
Cypræa miliaris var. nivea Preston, n. var. . . . 121
Cypræa robertsi Hid. 125
Cypræa sowerbyi Kien. 125
Cypræa xanthodon var. carnicolor Preston, n. var. . . 121
Danish Molluscan fauna, A small addition to the knowledge of the 54
Dendronotus frondosus 15
Diplommatina okiensis Pils. & Hir. 43
Euglandina liebmanni (Pfr.) 114
Epitonium (Acrilla) atwoodi Dall., n. sp. 80
Erato albescens Dall. 126
Euconulus fulvus and E. trochiformis 25
Exotic Vivipara in California 33
Facelina bostonensis Couth. 16
False shells 70
Ferguson, David W. (obituary) 124
Ganesella ferruginea okiensis Pils. & Hir., n. subsp. . . 44
Ganesella myomphala euomphala Pils. & Hir. . . . 44
Helicostyla leucophthalma togolandensis Pils., n. subsp. (Pl. IV, figs. 5, 6) 47
Helix arbustorum var. roseolabiata 72
Helix hortensis, A note on 30, 52
Heron held prisoner by a clam 82
Holospira bartschi Pils. & Clapp, n. sp. (Pl. VIII, figs. 5, 6). 114
Holospira goldmani Bartsch. 115
Homalogyra atomus in New England 95
Hyriine and Unioninæ, Remarks on the subfamilies . . 106

Ianthina globosa in California 37
Japan, Land shells of the Oki Islands 41
Kaliella okiensis Pils. & Hir., n. sp. 45
Kaliella gætanoi Pils. & Van., n. sp. (fig. 1) . . . 73
Kellia interstriata Aldrich, n. sp. (Pl. V, figs. 1, 2) . . 74
Kendig, Rev. A. B. (obituary) 111
Lamellidoris aspera 15
Laminella aspersa Baldwin, n. sp. 68
Laminella duoplicata Baldwin, n. sp. 68
Lampsilis iridella Pils. & Frierson, n. sp. 81
Laqueus morsei Dall, n. sp. 29
Lepton vaughani Aldr., n. sp. (Pl. V, fig. 12) . . . 76
Leptopoma tagolandense Pils., n. sp. (Pl. IV, fig. 1, 2) . 46
Leptopoma tagolandense var. immaculata Pils., n. var. . 46
Limax flavus 66
Littorina, The development of 83
Lymnæa bakeri Walker, n. sp. (Pl. II, figs. 11, 12) . . 18
Lymnæa cubensis Pfr. 7, 19
Lymnæa cyclostoma Walker, n. sp. (Pl. II, fig. 4) . 7, 19
Lymnæa davisi Walker, n, sp. (Pl. II, figs. 9, 10) . . 17
Lymnæa desidiosa (Pl. II; Pl. III) 18, 20
Lymnæa desidiosa var. peninsulæ Walker, n. var. (Pl. II, fig. 7) 9, 16
Lymnæa florissantica Cockerell, n. sp. 69
Lymnæa hendersoni Baker, n. sp. 140
Lymnæa marginata 5, 18
Lymnæa obrussa Say 22
Lymnæa palustris, Formation of epiphragm by . . . 33
Lymnæa petoskeyensis Walker, n. sp. (Pl. I, figs. 3, 5, 7). 6, 18
Lymnæa pilsbryana Walker, n. sp. (Pl. I, figs. 2, 8, 11). 4, 18
Lymnæa stagnalis var. perampla Walker, n. var. (Pl. II, figs. 5, 6) 8, 19
Lymnæa umbilicata 7, 19
Lymnæas, New Michigan 4, 16
Maine, Additional shells found in Aroostook County . 19
Maine, Fossil and living shells found in Little Mud Lake, Westland (Aroostook County) 105
Martyn's Universal Conchology 72
Meseschiza grosvenorii Lea 56

Mexico, Notes on shells collected at Balsas . . . 114
Minnesota Mollusks, Records of 119
Mitramorpha eocenensis Aldrich, n. sp. (fig.) . . . 13
Mollusca of Keene, New Hampshire 32
Nason collection 10
Nassa perpinguis var. bifasciata Berry, n. var. . . . 39
New England fauna, Shells new to the 95
New Mexico, Mollusks from around Albuquerque . . 103
Nitidella hendersoni Dall., n. sp. 31
Notes and news 10, 33, 59, 71, 82, 95, 122
Nudibrauch records, Two interesting New England . . 13
Opisthobranchiata, Northern 23
Palio lessonii 15, 16
Paludestrina salsa Pils. 53, 82
Partulina mutabilis Baldwin, n. sp. 68
Partulina winniei Baldwin, n. sp. 67
Pearl hunting in the Fox River, Illinois 122
Petrasma Dall., n. subgenus of Solemya 2
Pholadomya pacifica Dall., n. sp. 115, 142
Physa sayi 19
Pisidium in Massachusetts 113
Planorbis bicarinatus 122
Planorbis bicarinatus portagensis Baker, n. var. . . . 45
Pleurobema tombigbeanum Frierson, n. sp. (Pl. III). . 27
Polygyra matermontana Pils. 114
Polygyra mooreana 66
Publications received 34, 47, 83, 96, 122
Pyrgulopsis wabashensis 56
San Diego, Mollusca dredged at 134
Scala, Another large miocene 80
Shells collected at Balsas, Guerrero, Mexico, by Walter E. Koch in Dec., 1908 114
Showalter collection 117
Sicily, Shells of 128
Sigaretus (Eunaticina) erectoides Aldr., n. sp. (Pl. V, figs. 8, 9) 75
Solemya 1, 2
Solemya (Acharax) bartschii Dall., n. sp. 61
Solenomyacidæ, A revision of the 1

Somatogyrus decipiens Walker, n. sp. (Pl. VI, figs. 10, 11). 86
Somatogyrus hendersoni Walker, n. sp. (Pl. VI, fig. 2) . 87
Somatogyrus hinkleyi Walker, n. sp. (Pl. VI, figs. 8, 9) . 87
Somatogyrus pygmæus Walker, n. sp. (Pl. VI, fig. 3) . 88
Sphærium pilsbryanum Sterki, n. sp. 141
Strange shells 110
Strobilops, Notes on the genus 78
Strobilops quadrasi and S. trochospira 79
Stylommatophora, Some notes on the locomotive disk of . 49
Tagolanda, Land shells of 46
Terebratula (Liothyris) sakhalinensis Dall., n. sp. . . 28
Texas, List of the shells from Amarillo 9
Texas, Mollusca of McLennan County 63
Torinia discoidea sterkii Pils. & Van., n. subsp. (fig. 2) . 57
Trishoplita cretacea pergranosa Pils. & Hir., n. subsp. . 43
Trivia galapagensis, Notes on 11
Trivia mangeriæ, Note on 10
Turbonilla (Chemnitzia) gabbiana 39
Turbonilla (Chemnitzia) thaanumi Pils. & Van., n. subsp, (fig. 3) 58
Unionidæ, Supplementary notes on the breeding seasons of the 111
Unionidæ in Pennsylvania, The breeding season of . 91, 99
Unioninæ and Hyriinæ, Remarks on the sub-families . 106
Valvata humeralis californica Pils., n. subsp. . . . 82
Verrill collection 33
Verticordia (Haliris) granuloides Aldr., n. sp. (Pl. V, fig. 10). 75
Vertigo nylanderi Sterki, n. sp. 107
Vesicomya ticaonica Dall., n. sp. 63
Vivipara lecythoides Bens. in California 33
Waldheimia raphealis var. albida 30
Yates, Dr. Lorenzo G. (obituary) 124

INDEX TO AUTHORS.

Aldrich, T. H. 13, 74
Baker, F. C. 20, 45, 140
Balch, Francis N. 13, 59
Baldwin, D. D. 67
Berry, S. S. 37, 72
Bryant, Owen 82
Button, Fred. L. 10, 11
Clapp, Geo. H. 76, 114
Cockerell, T. D. A. 69, 72
Conner, Chas. H. 111
Coolidge, Jr., Wm. H. 32
Dall, W. H. 1, 28, 31, 51, 80, 115, 125, 142
Daniels, L. E. 119
Ferriss, J. H. 103
Frierson, L. S. 27, 81, 106
Gripp, C. W. 134
Hannibal, Harold 33
Henderson, Jr., J. B. 3, 9
Hinkley, Anson A. 56
Hirase, Y. 41
Johnson, C. W. 70, 123
Keene, L. A. 122
Macfarland, F. M. 23
Morse, Edward S. 95
Nylander, Olof O.. . . . . 19, 30, 105, 143
Ortmann, A. E. 91, 99
Pilsbry, H. A., 25, 41, 46, 56, 73, 78, 81, 83, 96, 103, 115, 123, 138
Preston, H. B. 121
Schlesch, Hans 54
Smith, Maxwell 128
Smith, H. H. 117
Sterki, V. 49, 107, 126, 141
Strecker, Jr., John K. 63
Vanatta, E. G. 56, 73
Walker, Bryant 4, 16, 85
Walker, R. D. 32
Wheeler, Rev. H. E. 97
Winkley, Rev. Henry W. 53, 54, 113

C. F. ANCEY

1860-1906

Imp. Berthaud

The Nautilus.

Vol. XXII. MAY, 1908. No. 1.

A REVISION OF THE SOLENOMYACIDÆ.

BY WM. H. DALL.

Having recently to review the species of the Lamarckian genus *Solemya*, and having nearly all the known species for study it was a surprise to find that the group contains three well marked subgenera and several subordinate sections. A full account is in preparation, meanwhile the following synopsis may serve to call attention to the subject:

Genus Solemya Lamarck, 1818.

I. Subgenus *Solemya* s. s.

Ligament amphidetic, chiefly internal. Type *S. australis* Lamarck.

Ligament appearing on the internal face of the valve in advance of the chondrophore.

A. Proximal part of the chondrophore prolonged as a thickened ridge part way across the interior surface of the valve, *S. australis* Lam.

B. Base of the chondrophore divided, anterior part extended as a narrow ridge; posterior part forming a thickened prop to the chondrophore; exposed ligament linear. *S. parkinsonii* Gray.

C. Chondrophore thickened, without props or extended rib. *S. solen* v. Salis.

II. Subgenus *Petrasma* Dall, *nov.* Ligament not exposed internally in front of the chondrophore; type *S. borealis* Totten.

A. Chondrophore supported by two strong props with a deep cavity between them.

1. *S. borealis* Totten.
2. *S. velum* Say.

B. Chondrophore with an anterior prop extended as a slender rib in front of the adductor scar; no posterior prop.

1. *S. occidentalis* Deshayes.
2. *S. pusilla* Gould.
3. *S. panamensis* Dall, n. sp.

C. Chondrophore without props. *S. valvulus* Carpenter.

III. Subgenus *Acharax* Dall, *nov.*

Ligament opisthodetic, wholly external, visible internally only where it crosses the gap between the margins of the valves. Nymphæ without props. Type *S. johnsoni* Dall.

1. *S. johnsoni* Dall.
2. *S. patagonica* E. A. Smith.
3. *S. agassizii* Dall, n, sp.
4. *S. ventricosa* Conrad, fossil.
5. *S. grandis* Verrill and Bush.

NOTES.—*S. togata* (Poli) auct., and *S. mediterranea* Lamarck, are synonyms of *S. solen*. *S. japonica* Dunker, is the adult of *S. pusilla* Gould. *S. macrodactyla* Rochebrune and Mabille is probably identical with *S. patagonica*, though the unique type of the latter seems pathologically callous dorsally.

S. protexta Conrad, if not the young of *S. ventricosa* Conrad, from the Miocene of Oregon, probably belongs to *Petrasma*.

S. occidentalis Deshayes, is common to the Mediterranean, West Indies and Gulf of Mexico. *S. panamensis* extends from off Santa Barbara, Cal., to Panama Bay; *S. valvulus* Carpenter, from San Pedro, Cal., to the Gulf of California; *S. agassizii* from off Tillamook Bay, Oregon, south to Aguja Point, Peru, in 1036–1800 fathoms, and *S. johnsoni* Dall, from Puget Sound to Panama Bay in 60 to 1740 fathoms.

The rarity of these species, and the fact that they usually break up into fragments in drying, are probably the reasons why the remarkable differences between the hinges of the different species have not previously attracted attention.

CUBAN NOTES.

BY J. B. HENDERSON, JR.

Mr. C. T. Simpson and the writer this winter yielded to the call of the wild, and we have just concluded another of our collecting orgies in the Antilles. This time we descended upon Cuba, and all of those delights of the chase formerly experienced together in the mountains of Jamaica and Haiti we renewed in this island of conchological joys.

Now the collector with two months at his disposal can pretty well clean up Jamaica, barring, of course, the rareties and the elusive small fry, but Cuba is an altogether different proposition. The island becomes surprisingly large after leaving Havana, and then it is only in the mountains that the really good picking is to be found. Then, too, the mountains seem always to be far away from the railroad or the towns where accommodations are to be found. If all the extensive plains and lowlands of Cuba could be eliminated by some Aladdin's lamp process and the mountain systems shoved up together, as they are in Jamaica, then indeed Cuba would present a field to the snail-hunter that no other place on earth could equal. The mountains are excessively rich in molluscan life, and the species found are for the most part of exceptional beauty and interest. The lowlands are not wholly without their mollusks, only there they are more scattered and difficult to find. The range of the lowland species seems to be much greater than that of the mountain forms. In fact one may travel all day by train and still find quite the same species of land shells. In the moutains, however, the distribution of species is often very restricted, sometimes to one side only of one particular hill. But as a rule a species occurring typically at a certain spot in a range of mountains gradually changes through varietal forms as one follows the range until it acquires a new name, and perhaps still another one later on. Thus it is in Cuba there are so many species of *Urocoptis*, of *Chondropoma*, of *Helicina*, *Eutrochatella*, etc., which belong to strongly-defined groups having a central typical form. One is constantly trying to verify a suspicion that the central typical form represents the ancestor that lived upon the higher land and survived a subsidence of the lower country, and that the other forms of the group are the descendants that have wandered away into new

surroundings and conditions as the island was raised to its present altitude.

There is need for much study on the distribution and evolutionary history of the Cuban land shells, and perhaps right here will be found the answers to some Cuban geological problems that fairly call aloud to the traveler. There is evidence, for instance, that Cuba was not very long ago divided and separated into several islands—a large east and a large west one—with several smaller islands lying between and projecting high above a shallow sea. Almost beyond question there has been a considerable exchange of species between Florida and that portion of Cuba lying directly south of Florida. This may be accounted for most plausibly by the migrating water fowl which divide their seasons between the great swamps of this portion of Cuba, the Everglades in Florida and the more northern waters of the United States.

If the editors of the NAUTILUS can afford me space later on I would like to give accounts of some of our personal experiences in the field, particularly about the southern edge of the great Zapata swamp, at Vignales in the Organ Mountains of Pinar del Rio, and finally of our race to catch those two most astonishing shells, *Urocoptis elliotti* and *U. dautzenbergiana*, which live only upon the lofty cliffs of two isolated mountains near Guane.

NEW MICHIGAN LYMNÆAS.

BY BRYANT WALKER.

A careful review of the *Lymnæas* of Michigan, incident to the preparation of Part II of the Michigan Catalogue, has increased the number of species represented in the state fauna from 18 as recorded in 1894 (Rev. Mich. Moll., p. 11), to 28 at the present time.

In the material examined, the following forms occurred, which seem worthy of specific or varietal recognition :

Lymnæa pilsbryana n. sp., Pl. I, figs. 2, 8–11.

Shell ovate-conic, slightly perforate ; dark brownish-yellow, frequently tinged with purple, with a light line just below the suture ; whorls 5, convex, with a deeply impressed suture, the three apical whorls small, forming a short conical apex, penultimate whorl twice

as long as the three preceding, inflated and convex, body-whorl large and well rounded; lines of growth strong and regular, cut by numerous fine spiral lines giving a shagreened appearance to the surface, in some specimens the last half of the body whorl is obsoletely malleated; aperture broadly oval, somewhat more than one-half of the entire length of the shell, dark brownish-yellow within, with a liver colored band just within the lip; lip sharp, regularly rounded and slightly expanded toward the basal margin; columella thick, white with a strong fold, broadly reflected over and appressed to the axial region, leaving only a very small perforation, and connected with the upper insertion of the lip by a broad white and rather thick (for the genus) callus; axis thick, solid, twisted.

Alt. (Fig. 8) 22; diam. 13½; length of ap. 13; width 10 mm.

Alt. (Fig. 11) 24; diam. 14; length of ap. 14; width 10 mm.

Type (No. 21345, coll. Walker) from Washington Harbor, Isle Royale, Lake Superior, Mich. Cotypes in the collection of the Philadelphia Academy and Chicago Academy of Sciences.

Immature specimens of this species were first taken by the University of Michigan expedition of 1904, and in the report of that trip (Rep. Geol. Surv. Mich., 1905, Separate, p. 97) was stated to be "related to *L. sumassi* Bd., but probably undescribed."

The expedition of 1905 was fortunate in securing fully-matured specimens. And a comparison of these with a photograph of cotypes of *sumassi* from the British Museum, kindly furnished by Mr. F. C. Baker, of Chicago, showed that the two forms were entirely dissimilar.

The affinities of *pilsbryana* are entirely with *L. emarginata* Say, a species of general distribution through the Great Lakes from Saginaw Bay northward.

It differs from that species in its darker color, more inflated whorls, especially those of the spire, and the entire absence of the emargination characteristic of that species.

L. emarginata was also found on Isle Royale, and there maintained the acute conical spire with a less impressed suture characteristic of the usual form of that species. The axis of the Isle Royale *emarginata* (fig. 1) is more slender, more curved and less twisted than that of *pilsbryana* (fig. 2). Both of these figures are made from immature specimens.

Lymnæa petoskeyensis n. sp., Pl. I, fig. 3, 5–7.

Shell elongate oval, acutely conic, perforate; thin, pale horn-color, almost white, translucent; whorls 6, regularly increasing, convex, with a well impressed suture; spire elongated, acutely conical, apical whorl minute; body whorl somewhat inflated, elongate oval; lines of growth fine and regular, cut by numerous very fine revolving, spiral lines, surface more or less malleated; aperture oval, subangulate above and rounded below, slightly more than one-half the entire length of the shell; lip thin and sharp; columella nearly straight without any fold, inner lip expanded and reflected over the round deep umbilicus and continued as a thick white callus over the parietal wall; where this callus passes over the umbilicus toward the basal margin it is abruptly depressed into the umbilical opening, forming a well marked furrow between the columella and the parietal wall, and giving the appearance of a twist to the face of the columellar enlargement, but the columella itself is scarcely affected by it; the axis is large for the size of the shell, without any trace of a fold, and nearly cylindrical, the base of the preceding whorl abruptly flattened around the insertion of the upper end of the pillar.

Alt. (Fig. 5) 23.5, diam. 11.25, ap. length 13, width 8 mm.

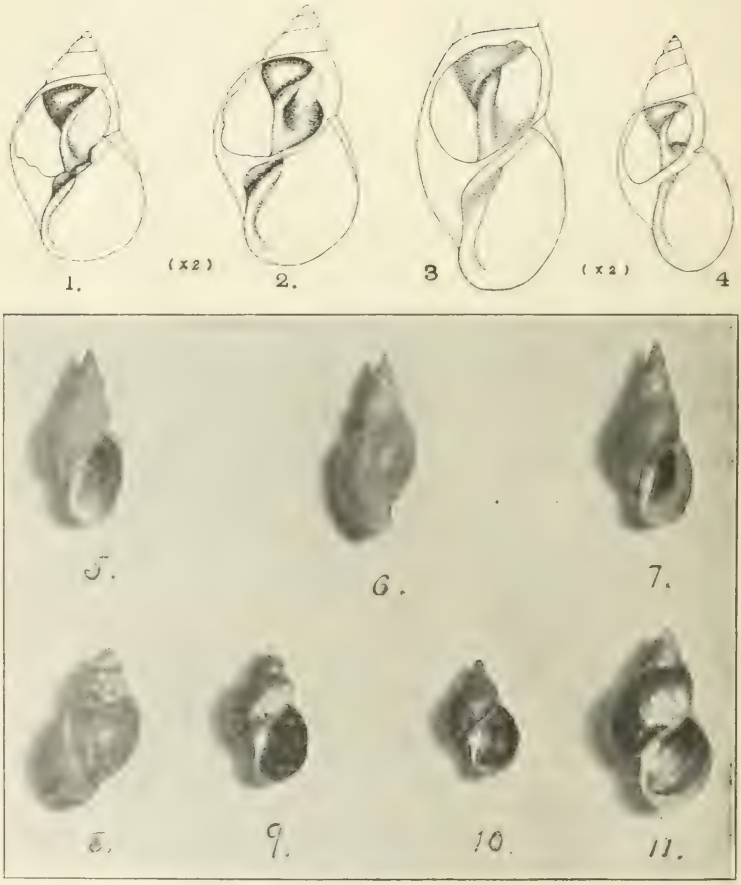
Alt. (Fig. 6) 24.5, diam. 11, ap. length 13.5, width 7.5 mm.

Alt. (Fig. 7) 25, diam. 10.5, ap. length 12, width 7 mm.

Types (No. 14347 coll. Walker) from a small spring-brook flowing into Little Traverse Bay, near Petoskey, Mich. Cotypes in the collections of the Philadelphia Academy and the Chicago Academy of Sciences.

This species was at first supposed to be a very thin, fragile form of the elongate variety of *L. catascopium*, characteristic of the lake region. But upon cutting into the shell, the peculiar shape of the axis forbade its reference to that species.

Under Dr. Dall's arrangement of *Lymnæa* (Harr. Exp. XIII, p. 64) it would belong to the section *Galba*. Compared with *L. desidiosa* Say, (Fig. 4) the axis of *petoskeyensis* (Fig. 3) is proportionately much larger, more elongated and more cylindrical, but the general features of both are the same. The peculiar contraction of the base of the whorl around the upper end of the pillar, so remarkably developed in *petoskeyensis*, is present, but not at all marked, in *desidiosa*. The umbilicus in *petoskeyensis* is round and deep, and is more conspicuous in the immature shells, as the expansion of the broadly reflected columella nearly covers it in the adult.



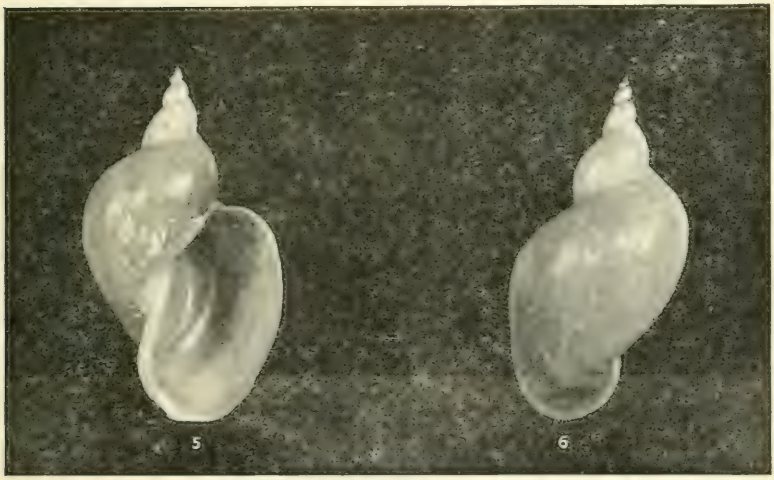
NEW MICHIGAN LYMNÆAS.

1.

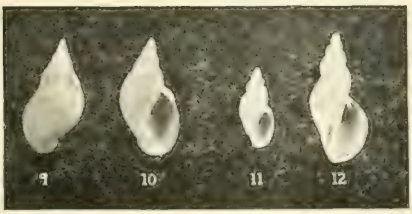
2.

3.

4.



7



8

NEW MICHIGAN LYMNÆAS.

The little brook, only a few hundred feet long, in which the species lives, is also the type locality for *Physa walkeri* Crandall.

Lymnæa cyclostoma n. sp. Pl. II, fig. 4.

Shell ovate conic, turreted, umbilicate, light yellowish horn-colored, shining ; lines of growth fine, irregular, subobsolete on the body whorl, stronger on the apical whorls, reticulated by indistinct revolving, impressed spiral lines. Spire elongated, apex subacute ; whorls 5, very convex, those of the spire somewhat shouldered, suture deeply impressed ; body whorl large, inflated, very convex. Aperture broad oval, subcircular, rounded above and below. Columella broadly reflected over the round, deep umbilicus, convex, smooth with no fold, parietal wall with a thin transparent callus. Lip sharp, but thickened within by a heavy white callus.

Alt. 7.5, diam. 3.25 mm.

Types (No. 13599 Coll. Walker) from Indian Creek, Kent County, Mich. Also from Alma, Gratiot County, Mich.

This very distinct little species was first collected by Dr. R. J. Kirkland, of Grand Rapids, Mich., and was listed as *L. cubensis* Pfr. (*umbilicata* C. B. Ads.) in my Review of the Moll. Fauna of Michigan (1894). Through the courtesy of Mr. E. A. Burt, curator of the Museum of Middlebury College, I have been able to examine the specimen of *L. umbilicata* deposited in that museum by Adams, and for comparison have figured it (fig. 1). The two species are so obviously distinct that verbal comparison is hardly necessary. *L. cyclostoma* differs in its more elevated, turreted spire, more broadly reflected columella and thickened white lip. It resembles *umbilicata*, however, in the sculpture, and is no doubt derived from the same stock.

In this connection it may not be out of place to add that the inspection of the authentic specimen of *L. umbilicata* confirms Dr. Pilsbry's reference of that species to *L. cubensis* Pfr. It is evidently distinct from *L. caperata* Say, and its reference to that species as a synonym by Haldeman, Tryon, Binney and others is quite erroneous.

The Middlebury specimen is not quite mature. It has $4\frac{1}{2}$ whorls and measures 6 mm. in height and 4 mm. in diameter. For further comparison I have figured (Fig. 2) a Rhode Island specimen, which is apparently typical ; the dimensions (6.5 x 4.25) agreeing almost precisely with those given by Adams. It is however, somewhat

more inflated than the Middlebury specimen. The apparent fold on the columella is evidently an individual malformation, as it does not appear in any of the other specimens in the same lot. Compared with typical *cubensis* (Fig. 3), *umbilicata* is more globose, with a shorter and more obtuse spire. If the difference holds good for the northern form, *umbilicata* would be entitled to varietal rank.

A single small specimen from Otter Lake (Lapeer? County), Michigan, (Text Fig. 1.) collected by the late Dr. Manly Miles, seems referable to *umbilicata*. It is smaller than the Rhode Island specimens (3.5 x 2) and differs somewhat in shape, the body whorl being somewhat shouldered and the spire more acute and slightly more elevated. But the characteristic axial (longitudinal) sculpture is present although there is no trace of any spiral lines. The lip is decidedly thickened within, and both it and the columella are pink. The umbilicus is not as large as in the Rhode Island form.

Fig. 1.

Lymnæa stagnalis v. perampla n. var. Pl. II, figs. 5 and 6.

This variety differs from the usual North American form, var. *appressa* Say, by its shorter, rapidly acuminating spire and larger, strongly shouldered body whorl; the first three whorls of the spire are slender and increase regularly in size; the penultimate whorl is disproportionately enlarged, swollen and subangulated by the flattening of the upper part of the whorl, which in the body whorl develops into a prominent shoulder.

Alt. (fig. 5) 45.5, diam. 26, length ap. 28, width 18 mm.

Alt. (fig. 6) 45, diam. 23.75, length ap. 26, width 17 mm.

Types (No. 1834 coll. Walker) from Houghton Lake, Roscommon County, Michigan. Cotypes in the collections of the Philadelphia Academy and the Chicago Academy of Sciences. Also from Douglas Lake near Petoskey, Michigan. All the specimens of *stagnalis* from Houghton Lake that I have seen, more than 30, are of this peculiar form, which apparently a well-marked local race.

I have been informed by the late Dr. W. H. DeCamp that the late A. O. Currier of Grand Rapids, who was the first to make known the peculiar Lymnæids of Houghton Lake, intended to describe this form under the very appropriate name which I have adopted for it.

An elevated, almost scalariform example of this variety was figured in the Nautilus, Vol. VI, pl. 1, fig. 6. It is interesting to

note that in Marl Lake a small enlargement of Marl River, which connects Higgins and Houghton Lakes, the typical *L. stagnalis appressa* was the only form found.

Lymnæa desidiosa var. peninsulæ, n. var. Pl. II, fig. 7.

Shell slender, elongated, spire long and acute, subturreted, whorls of the spire very convex, with a very deeply impressed suture, body-whorl elongated, subcylindrical, aperture oval, not very much expanded.

Alt. 13.50, diam. 6.25 mm.

(*To be continued.*)

LIST OF MOLLUSKS FROM AMARILLO, TEXAS.

BY J. B. HENDERSON, JR.

The "Pan Handle" of Texas is a flat, treeless plain where the traveler could make good use of nautical instruments. I could find no vestige of molluscan life there except in the deep cañons, a few of which are encountered on a journey across the "Handle." The following is a list of species taken from one of these cañons at a point about 15 miles S. E. of Amarillo. All were found in drift debris—none actually alive and crawling about. The identifications are by Pilsbry and Vanatta.

Zonitoides singleyana Pils.
Zonitoides minuscula Binn.
Vallonia perspectiva Sterki.
Vallonia gracilicosta Reinh.
Helicodiscus parallelus Say.
Pupoides marginatus Say.
Bifidaria pellucida hordeacella Pils.
Bifidaria tappaniana C. B. Ad.
Bifidaria armifera Say.
Bifidaria procera cristata P. & V.
Vertigo ovata Say.
Planorbis parvus Say.

A few specimens of Physa, Lymnæa and Pisidium too young for identification were also found.

NOTES AND NEWS.

THE NASON COLLECTION.—The University of Illinois has lately acquired the collection of shells of Dr. Wm. A. Nason, of Algonquin, Illinois. The collection numbers approximately 50,000 specimens, representing 10,000 species. Among these are large series of the species found in Illinois, together with many beautiful specimens from various parts of the world.

THE ANCEY LIBRARY.—The books and many of the papers of the late C. F. Ancey can be obtained from Mr. Gerat, 76 rue du Faubourg St. Denis, Paris, France.

NOTE ON CYPRÆA GRACILIS, GASK.—A few months ago, among some small shells from unknown localities which came into my hands, there appeared a small cowry which for a time puzzled me exceedingly, being very different from any of the species then known to me. Upon careful study, however, in connection with the various monographs of the *Cypræidæ*, it has proven unmistakably to be the very rare *Cypræa gracilis*, Gask, the type of which was brought from the China Seas by the "Samarang" and which has since been found only at Mauritius and Reunion I. (Weinkauff, Hidalgo). Although the coloration of the back has been obliterated, the specimen being beach-worn, it has the peculiar lip, the narrow, bent aperture, sparsely scattered reddish-brown dots and fine teeth called for in the Gaskoin description, and it also corresponds, as to base and contour, to the figure in the Sowerby monograph, probably copied by Weinkauff and Roberts. Length, 10 mm.

FRED L. BUTTON.

NOTE ON TRIVIA MAUGERIÆ, GRAY.—Of this very rare species —sometimes also known as Tr. "Maugeri," (Roberts, Hidalgo) and thus far found only at the Galapagos Is.—I have known but three examples in all the West American collections. The first which appeared was a badly bleached one which I detected among the molluscan material brought back by the Stanford University expedition of 1898, the specimen being now in the University collection. The second, a fine one in the Arnheim collection at San Francisco, was unfortunately destroyed in the great fire of 1906; while my own specimen, although beach-worn, is in fair condition and color. Length, 13 mm.—FRED L. BUTTON.

NOTE ON TRIVIA GALAPAGENSIS MELV.—Upon examination of the molluscan material brought back by the Stanford University expedition to the Galapagos Is. in 1898, I noticed this novelty and sent it to Mr. Melvill for description (Ann. & Mag. Nat. Hist., Aug., 1900.) Although the small type lot of this interesting species were all jet black and shiny, I have since then obtained from the same locality another specimen which is clearly referable to this species but which is of a reddish-brown color, while all the other specific characteristics, including the two whitish spots on the back, are well marked. As already noted by me (Jour. of Conch., Oct., 1902) this species proves to be ribbed throughout when perfect, instead of smooth on the back, as described.—FRED L. BUTTON.

PUBLICATIONS RECEIVED.

A SURVEY OF THE SPECIES AND VARIETIES OF PUPA DRAPARNAUD, OCCURRING IN SOUTH AFRICA. By JAMES COSMO MELVILL and JOHN HENRY PONSONBY (Ann. & Mag. Nat. Hist., I, ser. 8, pp. 70–86, pl. i, ii, 1908). The paper is based on a collection made by Mr. Henry C. Burnup, to whom credit is given for two new forms. The figures are excellent. In all 28 species are recorded, with several varieties.

DESCRIPTIONS OF NINE TERRESTRIAL MOLLUSCA FROM SOUTH AFRICA. By JAMES COSMO MELVILL and JOHN HENRY PONSONBY, INCLUDING ANATOMICAL DESCRIPTIONS OF TWO PROPOSED NEW GENERA (*Afrodonta* M. & P. and *Peltatus* G.-A.). By Lt.-Col. H. H. Godwin-Austen (Ann. & Mag. Nat. Hist., I, ser. 8, pp. 129–136, pl. 7 and 8, 1908).

C. F. ANCEY.[1]

César-Marie-Felix Ancey, administrator at Mascara, Algeria, was born in Marseilles, November 15, 1860. His father, well known

[1] Taken in part from the obituary by Mr. H. Fischer (Jour. de Conch., LV, pp. 404–496), to whom we are also indebted through Mr. Geret for the accompanying portrait. A complete list of Mr. Ancey's writings will be found in the above publication, pages 406–412.—EDITORS.

for his publications on entomology and author of valuable work on malacology, encouraged his well-developed inclination for zoölogical studies. At the age of twenty-three he was appointed conservator of the fine Oberthur entomological collection at Rennes. This position not promising material success, he returned to Marseilles, where he studied law, and obtained his diploma in 1885. He then entered the government administration in Algeria; was married in 1889, and the same year was appointed deputy administrator, and filled successively positions at Fort National, Boghari and Dra-el Mizan. After thirteen years spent in that locality he was promoted to acting administrator at Mascara. It was a just reward for his great qualifications and for the esteem which he had been able to win amidst duties that were frequently of a difficult character.

Mr. Ancey hoped shortly to fill a State mission to the Cape Verde Islands, which was sure to furnish opportunities for malacological studies. After a brief illness he died at Mascara, October 10, 1906. His death was a painful surprise to his scientific correspondents.

Most of his writings were on conchology, and his many papers, some 140 in all, give an idea of the importance of his work, devoted principally to the malacological fauna of Hawaii, Central Africa, Polynesia, Central Asia, etc. He was especially interested in the study of the smaller land shells, of which he had a large collection. As his appointment to Mascara promised to be permanent, he expected to be able to work up his large accumulation of undetermined species, still packed just as he had received them. It was his purpose some day to study the land mollusks of Algeria; although thoroughly competent for the work, he hesitated to undertake it on account of the difficulties arising from the many doubtful species, which made the study of the Algerian fauna a most ungrateful task.

Mr. Ancey is authority for many generic or subgeneric names, among which may be mentioned: *Boysidia*, *Parabalia*, *Haplotrema*, *Pseudomphalus*, *Monomphalus*, *Micromphalia*, *Platystoma*, *Rhytidiopsis*, *Pararhytida*, *Microphyura*, *Ochroderma*, *Tomostele*, *Mabilliella*, *Thomsonia*, *Lechaptoisia*, *Thaanumia*, *Baldwinia* and *Armandiella*. The genus *Anceyia* was dedicated to him by Bourguignat. Remarkably gifted and thoroughly acquainted with the bibliography of the subject, he leaves behind him work which marks a real progress in our knowledge of the terrestrial mollusks. His untimely death is a great loss to science.

THE NAUTILUS.

VOL. XXII. JUNE, 1908. No. 2.

A NEW EOCENE FOSSIL FROM CLAIBORNE.

BY T. H. ALDRICH.

MITROMORPHA EOCENENSIS, n. sp.

Shell small, but five whorls remaining (the embryonic whorls are broken off), sulcate, the longitudinals close set and prominent, the spirals the same on the smaller whorls, but on the body whorl more prominent at the suture and the base; suture distinct and rather deep; outer lip denticulated; pillar lip with two tubercles, the one nearest the canal long and tapering. Canal short, slightly widened and slightly twisted.

Length 7 mm., breadth 3 mm.

Locality: Claiborne Sand Bed, Claiborne, Alabama.

Remarks: In *Mitromorpha pygmaea* Dall and others examined, the spiral sculpture seems to predominate, but in the species described above the longitudinal is the stronger.

TWO INTERESTING NEW ENGLAND NUDIBRANCH RECORDS.

BY FRANCIS N. BALCH.

The absolutely lamentable state of our present knowledge (or rather ignorance) of the New England Nudibranchs is in no small part due to the capricious and baffling occurrence of that interesting

group. Here to-day and gone to-morrow, perhaps abundant one year and not observed again for decades, even on shores where they are in most years common if rightly sought at the right season, they remain practically unknown to many whose collecting is done only in summer.

A good deal of evidence has accumulated to show that many of the forms, chiefly Aeolidians, have a peculiar life-history, somewhat as follows: Coming on the shore in early spring they breed in the rock-pools or not far below low-water mark, and almost immediately die. The young, growing slowly at first and escaping observation by reason of their minute size and often marvelously "protective" (?) coloration, work their way slowly off shore with the coming of warmer weather, migrating still further out as the cold sets in, and attain their growth over winter in comparatively deep water, only to perform the reverse migration, breed and die the next spring. They are thus annuals. This is supposed to be the case particularly with Aeolidian forms, but not even for them is the theory universally accepted. There are certainly grave objections to it. It has been urged that neither the on-shore nor the off-shore migration has been followed; that the young ought not to escape observation over summer even though minute and inconspicuous; that they occasionally, though rarely, occur in summer adult or nearly so; that the dredge fails to reveal them of nearly adult size in winter when they should occur. On the other hand it is a fact that many of the species have a fairly definite season (usually early spring, more rarely late autumn, and still more rarely at other times) when in most years they are with us in fair numbers and of full size, and thereafter—and suddenly—thence depart and are seen no more till the next year at the same season or perhaps many years later at the same season. This holds good of the rocky shores in the neighborhood of Boston, and I imagine few of us have ever seen there, except in spring, more than very scant and scattering examples of the Aeolid type.

The following captures, therefore, have a distinct interest, even though, by the fault of the writer, it is much less than it should be.

On November 15, 1905, Owen Bryant, Esq., of Cohasset, Mass., took from kelp dislodged by a storm from water of moderate (but uncertain) depth more than sixty Nudibranchs of at least eleven different species practically in company at that one spot. Not one was very young (less than say 3–4 mm.) Not one was adult.

He very kindly notified me and gave a Sunday to a trip to Cohasset where I saw the remarkable haul still alive. The early darkness of a November afternoon, the absence of apparatus and books and my absorption in professional work which precluded the possibility of my attempting to transport and preserve the living creatures for further study, may be held sufficient excuse for my failure to identify the species at the time fully and reliably, but not for my apparent failure to preserve some of the more interesting forms for later working over. To my great regret, however, the single Dorid form is the only one I am now able to find.

The species identified were as follows according to my notes:

Cratena gymnota (Couth.). "1 specimen quite juv., cores of cerata very dark."

? *Cratena veronicae* Verrill. "1 specimen, abt. $\frac{3}{4}$ in., cerata very green, *very* like viridis A. & H." *

Coryphella mananensis (Stimps.) "1 specimen, abt. $\frac{1}{2}$ in., juv."

? *Coryphella salmonacea* (Couth.). "> *diversa* Couth., 1 nearly adult spec., abt. 1 in." Unfortunately *salmonacea* (Couth.,) [now Bergh] does *not* include *diversa* (Couth.), as I then supposed, and both species are in utmost need of further elucidation. Wherefore I much regret my failure to preserve this specimen as a consequence of which I am now quite unable to say what I really had before me—at all events something wholly distinct from *mananensis*.

Dendronotus frondosus (Ascanius). "3 specimens, abt. 1 in."

Dendronotus robustus Verrill. "1 specimen, abt. $\frac{3}{4}$ in."

Palio lessonii (d'Orb.) "2 specimens, abt. $\frac{1}{2}$ in., like A. & H's. figures of adult but anal tubercles very conspicuous and white instead of yellow."

Lamellidoris aspera (A. & H.) > *pallida* A. Ag. "1 specimen, juv., abt. $\frac{1}{2}$ in."

The above enumeration certainly includes all the species (and likewise all the specimens) of all except the Aeolid forms. But of the Aeolid species enumerated there were in all likelihood many more specimens, while I noted that there were at least three obviously different Aeolid species which I did not undertake to name. Quite probably there were more. The whole enumeration only

* I had Alder & Hancock's figure before me in making the comparison.

accounts for eleven specimens out of more than sixty. I only had time to note the larger and more conspicuous ones.

On September 19, 1907, Mr. Bryant made a somewhat similar haul, although less interesting. He most kindly brought the material to me still alive, and I was able to study it more adequately.

There were twenty-nine specimens of three species, and all were taken together from the bottom of a floating clam-car.

The species were as follows:

Facelina bostoniensis (Couth.) now *Coryphella bostoniensis* (Couth.). Bergh et auct. al. Europ., "7 specimens, 4 to 10 mm."

Coryphella mananesis (Stimps.). "2 specimens, 8 mm., 14 mm."

Palio lessonii (d'Orb.). "20 specimens, 1 abt. 12 mm., the rest abt. 5 mm. Seem browner in coloration and much more sparsely tuberculated, with relatively more conspicuous circumanal tubercles than the European type as figured."

It will be noted that here again not one is adult, while not one is very young.

It seems to me that these two captures suggest strongly an autumnal condensation of the half-grown *Nudibranch* population (of certain groups) in moderate depths, just off the shore perhaps, best explained tentatively as a "wave of migration" to deeper water for the winter. It is clear enough how a population, which would be very sparse if spread over the whole area from three fathoms, let us say, to extreme low-water mark, might be much condensed if the cooling waters or failing food supply set them all moving off shore about the same time, only to check and bank up at the edge of some particular deep channel or cold current or on some specially favorable hunting-ground which all hitherto living anywhere inshore of it must cross.

NEW MICHIGAN LYMNÆAS.

BY BRYANT WALKER.

(*Concluded.*)

Lymnæa desidiosa peninsulæ

Types (No. 20040 Coll. Walker) from the headwaters of the Union River, Ontonagon County, Michigan. Cotypes in the collections of the Philadelphia Academy and the Chicago Academy of Sciences. Also from Little Iron River, Ontonagon Co., Salmon

Trout River, Marquette Co., and the St. Mary's River at Saulte Ste. Marie, Mich.

This variety differs from the usual and more typical form (pl. I, fig. 4 and pl. II, fig. 8) of general distribution in the lower Peninsula, by its slender, elongated form. It is apparently characteristic of the small rivers tributary to Lake Superior. With the exception of a few specimens from Saulte Ste. Marie, the typical form of *desidiosa* has not been as yet found in the Upper Peninsula at all. *Peninsulæ* is very similar in shape to a small form of general distribution through the State, which is probably referable to some one of Lea's indefinite species, but differs by its much greater size, being twice as long with the same number of whorls. As a characteristic local form of a large region, it seems worthy of a name.

Lymnæa davisi n. sp. Pl. II, fig. 9–10.

Shell of medium size, globose-conic; perforate; light horn-color; whorls 5; the spire about one-third of the entire length of the shell, rapidly acuminating and with a minute, sharp apex; the whorls of the spire are flattened and but slightly convex, with a distinct, but not deeply impressed, suture; body whorl large, inflated, ovate, flattened above and rounded below; lines of growth distinct, fine and regular, minutely decussated with revolving spiral lines; aperture large, pear-shaped, acutely angled above and broadly rounded below, about three-fifths of the entire length, lip sharp, slightly thickened within, straight above, somewhat expanded below, broadly reflected over and nearly covering the small umbilical perforation; columella with a very slight fold; axis rather thick, round, scarcely if at all folded.

Alt. (Fig. 9) 15.2, diam. 7.5 mm.

Alt. (Fig. 10) 15, diam. 7.5 mm.

Types (No. 20092 coll. Walker) from Fish Point, Tuscola County, Mich. This species is well characterized by its large, ovate body whorl and its very acute spire; the apical whorls are flattened and the straight line of spire is prolonged over the upper part of the body, giving a "pot-bellied" appearance to the shell.

Named in honor of Prof. Charles A. Davis of Ann Arbor, its discoverer, in recognition of the many valuable contributions he has made to our knowledge of the distribution of the mollusca in Michigan.

Lymnæa bakeri n. sp. Pl. II, figs. 11–12.

Shell slender, elongate, perforate; whorls 5; spire elongated, turreted; apex acute; body whorl narrow, elongated, compressed below; suture deeply impressed; lines of growth fine and regular with fine subobsolete, revolving, spiral lines; aperture narrow, elongated, within the flare of the lip, the sides are nearly parallel, and about equally rounded above and below; lip thin, sharp, suddenly and broadly expanded, subreflected, continuous, not appressed to the parietal wall, and roundly reflected over the perforation, columella straight, without a fold; axis round and smooth.

Alt. (fig. 12) 16.5, diam. 7.5, length ap. 8.5, width 4.5 mm.

Types (No. 9353 Coll. Walker) from Pine Lake, Charlevoix County, Mich.

This remarkable species was dredged from the marl bottom of Pine Lake. No living specimens were found, and in all probability it is extinct. In its external characteristics it is more nearly related to *L. jayi* Dunker (*gracilis* Jay) than to any other of the described species, but the resemblance is a general one only, the two species differing in nearly every detail. The continuous, free lip and straight columella are exceedingly like those of *jayi*, and would naturally cause it to be referred to the subgenus *Acella*. But the axis is not gyrate, as in that group, but is rounded and without a fold, as in *Galba*.

The young shell (fig. 11) is subcylindrical, and with its heavily-shouldered, turreted whorls and narrow aperture reminds one of the curious *L. contracta* Currier from Houghton Lake. I take pleasure in dedicating this very peculiar species to Mr. Frank C. Baker, of the Chicago Academy of Sciences, who has made a special study of the North American *Lymnæas*.

Explanation of Plates.

PLATE I.

Figures 1–4 inclusive are enlarged. The remainder are of natural size.

Fig. 1. *L. emarginata* Say (immature), Isle Royal, Mich.

Figs. 2, 9 and 10. *L. pilsbryana* Walker (immature), Isle Royal, Mich.

Fig. 3. *L. petoskeyensis* Walker, Petoskey, Mich.

Fig. 4. *L. desidiosa* Say, Ann Arbor, Mich.

Figs. 5, 6 and 7. *L. petoskeyensis* Walker (types), Petoskey, Mich.

Figs. 8 and 11. *L. pilsbryana* Walker (types), Isle Royal, Mich.

PLATE II.

Figures 1 to 4 inclusive are enlarged on the same scale. Figures 7 and 8 are also equally enlarged, but on a smaller scale. Figures 5, 6 and 9 to 12 inclusive are natural size.

Fig. 1. *L. umbilicata* C. B. Ads. (ex auct.), New Bedford, R. I.

Fig. 2. *L. umbilicata*, Rhode Island.

Fig. 3. *L. cubensis* Pfr., Enterprise, Fla.

Fig. 4. *L. cyclostoma* Walker (types), Indian Creek, Kent County, Mich.

Figs. 5 and 6. *L. stagnalis perampla* Walker (types), Houghton Lake, Mich.

Fig. 7. *L. desidiosa peninsulæ* Walker (types), Union R., Ontonagon, County, Mich.

Fig. 8. *L. desidiosa* Say, Oakland County, Mich.

Figs. 9 and 10. *L. davisi* Walker (types), Fish Point, Tuscola County, Mich.

Fig. 11. *L. bakeri* Walker (young) Pine Lake, Charlevoix, Mich.

Fig. 12. *L. bakeri* (type), Pine Lake, Charlevoix, Mich.

ADDITIONAL SHELLS FOUND IN AROOSTOOK COUNTY, MAINE.

BY OLAF O. NYLANDER.

Circinaria concava Say, one small living shell of this species found at Sherman, in 1904.

Physa sayii, Tappan, very fine, large specimens found in Callen's mill pound, Caribou stream, Caribou, Maine, at Salmon brook, Lake Perham and in the dead water on Salmon brook in Woodland.

Lymnæa palustris Mull., a large colony of this species was found in a small brook on G. C. Hall's farm 3 miles south of Caribou village.

Planorbis bicarinatus var. The carinations on this are extremely developed; Portage Lake, Square Lake and Cross Lake all on Fish River.

Volvata sincera var. *nylanderi* Dall., Portage Lake, Square Lake and Cross Lake, dredged at various depths to 25 feet.

NOTE ON LYMNAEA DESIDIOSA SAY.

BY FRANK COLLINS BAKER.

An examination of Say's specimens of *L. desidiosa* in the Academy of Natural Sciences of Philadelphia reveals the fact that all subsequent naturalists have misunderstood this species and have given the name to a species belonging to a different group of Lymnaeas. The true *desidiosa* is a member of the *palustris* group, as shown by Say's specimens and by a close study of Say's descriptions. The two specimens in the Philadelphia Academy may be described as follows:

Shell oblong-ovate, rather solid, color pale horn; surface dull, lines of growth crowded, conspicuous, crossed by impressed spiral lines; whorls $5\frac{1}{2}$, convex; the body whorl is quite convex; spire acutely conic, about as long as the aperture; sutures well impressed; apex of $1\frac{1}{2}$ whorls, brownish horn; aperture long ovate; outer lip thin, with an internal rib or varix; inner lip reflected over and appressed to the parietal wall, leaving a small umbilical chink; columelar axis with a distinct plait.

Length 15.00, breadth 7.50, aperture length 8.00, breadth 3.00 mill.

Length 14.25, breadth 7.50, aperture length 7.75, breadth 3.50 mill.

The specimens bear the following label in the original handwriting:

Lymnaea desidiosa Say, Journ. Acad., v. 2, p. 169. T. Say, Penn.? (No. 58731).

The figure in Binney (fig. 68) is said to be from an authentic specimen in the Philadelphia Academy, but no such specimen is now in existence, nor are the specimens mentioned from Cayuga Lake to be found. In the absence of any other authentic material Say's specimens must be taken as typical of *desidiosa*. A close analysis of Say's description would seem to indicate that he did not have the shell before him which has so long borne the name of *desidiosa*. He says "It is closely allied to *elodes*, but the whorls are more convex, one less in number, and the two terminal ones are proportionately smaller."[1] This statement is repeated in the American Conchology. This statement of its relation to *elodes* would

[1] Journ. Acad. Nat. Sci., ii, p. 169.

scarcely have been made by Say, who possessed a peculiarly discriminating sense of minute differences between shells, if he had been describing the shell now known as *desidiosa*. The size of the Philadelphia specimens (15 mill.) also corresponds pretty well with the size given by Say ($\frac{2}{3}$ of an inch = about 17 mill.). The most convincing fact to the writer is the presence of a specimen of "*desidiosa*" of authors in the Philadelphia Academy marked "*Lymnaea* . . . . . , Canandaigua Lake, T. Say" (No. 58732), showing that the form usually called *desidiosa* is not the one so called by Say. Prof. Edward S. Morse, who made the drawings for Binney's work, has been unable to give any information concerning the specimen figured by Binney.

Last summer the writer made three trips to Cayuga Lake, one to the south end at Ithaca and two to the north end at the town of Cayuga, with the hope of securing specimens which would correspond with Say's specimens. Three whole days were spent in exploring several miles of the shore and the small creeks, and while specimens of both *palustris* and *obrussa* were obtained, not a single specimen was found which agreed with Say's *desidiosa*. The *palustris* were the large, thin-shelled form and the *obrussa* were rather small specimens, not at all like the description or specimens of *desidiosa*. As Say gave no particular part of Cayuga Lake as the identical spot in which the types were collected, it renders the task of finding locotypes well nigh impossible, since the lake is 88 miles in length.

Recently, Miss Mary Walker, of Buffalo, New York, sent the writer a number of shells from Young's Quarry, Williamsville, New York, which are identical with Say's specimens of *desidiosa*, having the same number of whorls and almost the same measurements. These are given for comparison:

Say's specimens:

Length 15.00, breadth 7.50, aperture length 8.00, breadth 3.00 mill.

Length 14.25, breadth 7.50, aperture length 7.75, breadth 3.50 mill.

Miss Walker's specimens:

Length 15.00, breadth 8.00, aperture length 8.00, breadth 4.00 mill.

Length 14.00, breadth 8.00, aperture length 8.00, breadth 3.50 mill.

Say's figure in the American Conchology (plate 55, fig. 3) corresponds with the specimens from Williamsville, all having the peculiar obese body whorl. Say himself identifies *desidiosa* from western New York in Long's expedition, II, p. 263, where he says, "*Lymneus desidiosus* nob. Falls of Niagara."

The history of *desidiosa* in the American monographs is interesting and clearly indicates that since Say's time little attention has been given to closely analyzing this species. In all of his references Say distinctly indicates a shell of the *palustris* type.

Haldeman describes and figures the form now distinguished as *obrussa* and not the true *desidiosa* (compare his plate with Say's figure 3). Many of Haldeman's figures are abnormal and do not represent *obrussa* as it is usually developed. Tryon, in his continuation of Haldeman's work, (p. 104) states that many of the figures on this plate are not *desidiosa* but a form of *columella* (*macrostoma*). In this statement Tryon is wrong and could scarcely have seen Haldeman's specimens, for a recent examination proved them all to be referable to *obrussa* (*desidiosa* of authors) although as stated above several of the specimens are abnormal. The writer has collected many specimens similar to those figured on Haldeman's plate.

Binney, in his Land and Fresh-water Shells of North America, Part II, makes *obrussa* a synonym of *desidiosa*, thus showing that he considered the latter the small, smooth form and not the true *desidiosa* of Say and his figure 68 is questionable for the reason and is probably of a long-spired *obrussa*. In Baker's Mollusca of the Chicago Area *obrussa* is described and figured as *desidiosa*.

Recently Dr. W. H. Dall, in his Alaska Mollusks (p. 73, fig. 51) figures Say's *obrussa* under *desidiosa*, but also refers in his synonymy to Binney's figure 68. The European monographs have given figures referable to *obrussa* rather than to *desidiosa*.

Amidst the uncertainties caused by the absence of Say's types we must look for a shell which is closely allied to *elodes*, but is smaller, with more convex whorls, and possesses 5 instead of 6 full whorls. Such a shell is found in the autotypes of *desidiosa* in the Philadelphia Academy, and this type of shell occurs in several localities in the eastern part of the United States, and is easily separable from any other known species or variety. The spire varies considerably, being short, or long, or even scalariform. There are from 2 to 5 rest varices on the whorls.

Desidiosa, then, differs from *obrussa* (*desidiosa* of authors) in its generally larger and more solid shell, longer and more turreted spire, more pronounced and heavier sculpture and more convex whorls, with deeper sutures; in having an internal rib inside the outer lip and in the presence of a fold on the columella. Compared with *palustris*, *desidiosa* is smaller, usually more solid and with a more obese body whorl and a more dilated aperture. The spire, too, is more sharply conic and the whorls are more tightly coiled, producing a deeper suture. The inner lip is also more expanded, producing a heavier callus. The shells called *elodes* by Say are larger, more flat-sided, with a longer spire, and the whorls are not so rounded and are more oblique.

If we accept the evidence afforded by Say's specimens (and there seems to the writer to be no other course), then the shells usually called *desidiosa* must bear the name of *obrussa*, which is the first available name, and *desidiosa* must be used for the shells so-called by Say.

Explanation of Plate III.[1]

Fig. 1. *Lymnæa desidiosa* Say, Williamsville, Erie Co., N. Y. (from collection of Miss Mary Walker, Buffalo, N. Y.)

Fig. 2. Say's figures of *Lymnæa desidiosa* in Amer. Conch., pl. 55, fig. 3.

NORTHERN OPISTHOBRANCHIATA.

BY F. M. MACFARLAND.

Northern and Arctic Invertebrates in the Collection of the Swedish State Museum (Riksmuseum). III. Opisthobranchia and Pteropoda. By Nils Odhner (Kungl. Svenska Vetenskaps Akademiens Handlingar, Band 41, No. 4, pp. 1–118, pl. I–III, 1907).

The above work will be welcomed by American zoölogists as a valuable contribution to our knowledge not only of the Opisthobranch fauna of Scandinavian waters, but also as of great convenience in studying the quite similar fauna of our own North Atlantic shores. The classic *Index Molluscorum Scandinaviæ* of Lovén, 1846, and the *Mollusca Regionis Norvegiæ* of Sars, 1878, have been for

[1] Plate III will appear in the July number.

many years the principal extended sources of information upon this subject. The paper of Mr. Odhner is based upon the large collection of Northern and Arctic forms which the Swedish State Museum has accumulated from various expeditions and other sources since its foundation, and which have been studied in part only by scientists. The geographical area represented is a wide one, nearly completely circumpolar in its extent. It includes principally the Arctic Ocean off Siberia, the Kara and White Seas, the Arctic and Atlantic Oceans off the coast of Norway, the waters surrounding the whole Scandinavian peninsula, and to a less extent the coasts of Spitzbergen, Iceland and Greenland, the North Atlantic, Davis Strait, Baffin Bay and Bering Sea.

The first section of the paper gives a useful systematic synopsis of the Opisthobranchs and Pteropods studied, based largely upon the well-known works of Fischer, Bergh and Pelseneer. Following this is a detailed summary of the geographical and bathymetrical distribution.

The third section of the work is devoted to a description of the new forms found in the collection. These are *Diaphana hyalina* Turton var. *spirata*, *Diaphana glacialis*, *Goniæolis lobata*, *Archidoris nobilis* Lovén MS., *Issa villosa*, *Doriduncula pentabranchus*, *Idalia pulchella* A. & H. var. *fusca*, and *Cumanotus laticeps*, the last named being the type of a new genus of Aeolidiadae.

Of especial interest and value to students of this group of Mollusca are the three excellent plates, the second and third being especially welcome. These two present artistic reproductions in the natural colors of sixty-one figures of forty-one different species, prepared under the direction of Professor Lovén by the artists W. and F. v. Wright, but never yet published. These form a valuable supplement to Lovén's Index, the original numbers assigned by him being given in parentheses upon the plates. Those who have studied these beautiful animals in life and compared them with even the very best museum specimens, in which original color and body form have alike disappeared, will fully appreciate this preservation in a permanent manner of these important records.

The usefulness of the paper is further enhanced by a chronological bibliography and a very complete index. The convenience of the former might have been increased somewhat by the addition of abbreviated titles of all the papers cited, which are omitted in most cases, the date, author, journal and place alone being given.

1 2

3 4

1, 2. LYMNÆA DESIDIOSA SAY.
3, 4. PLEUROBEMA TOMBIGBEANUM FRIERSON.

The Nautilus.

Vol. XXII. JULY, 1908. No. 3.

ON EUCONULUS FULVUS AND E. TROCHIFORMIS.

BY HENRY A. PILSBRY.

Helix fulva as described by Müller (1774) was a composite of two species: (1) adult *Helix fulva* of Draparnaud and later authors, and (2) immature *Helix bidentata* Gmelin. Müller's idea exactly reversed the age-relations of the two forms; he considered (1) to be the young stage of (2), and while he described both forms satisfactorily, and gives the measurements of both, a fuller description is naturally given of the form he considered adult. The somewhat unusual conic shape, etc., rendered it easy for subsequent authors to recognize both forms from Müller's description. Indeed it would be hardly possible to mistake any other snail of the region for either.

The next notice of the forms was by Gmelin (1791), who admits Müller's *H. fulva* without recognizing its composite nature, his account being merely compiled from Müller. Gmelin moreover described and named the adult stage of *Helix bidentata*, referring to unmistakable figures in the *Conchylien Cabinet* of Chemnitz. There has never been any controversy about the validity of Gmelin's *H. bidentata*.

Ten years later (1801), Draparnaud, in his *Tableau des Moll. terr. et fluv. de la France*, p. 72, restricts *Helix fulva* to the *Euconulus*, giving an excellent description. He also recognized and described *H. bidentata*, the two being quite rightly placed in different groups. Up to the present time this arrangement has been followed almost universally.

Two years later, in 1803, Montagu described and figured *Helix trochiformis* (*Testacea Britannica*, p. 427). The account agrees well with our *Euconulus fulvus* except in the number of whorls, Montagu giving it six, which is one more than *E. fulvus* usually has. Montagu did not recognize Müller's snail in his new species. His knowledge of the work of continental authors seems to have been extremely restricted.

So far as I know, the name *trochiformis* has been adopted only by Beck, in his catalogue of 1837, and by Dall, 1905.[1] No description of the snail under Montagu's name has been published since the original one in 1803.

So much for the evidence from original documents. I am acutely aware that on any question of nomenclature there may be from two to a dozen opinions, each supported by arguments which to some will appear conclusive, yet in a case like this, where the conchologists of a century have been practically of one mind, a reversal of their judgment should not be made without full consideration of all aspects of the question. It might reasonably be argued that Müller's description, covering the adult stage of one species (*fulva* auct.) and the immature stage of another (*bidentata* Gmel.), should be restricted to the former, even though Müller himself mistook the real relations of the forms. It is hardly necessary to discuss the inexpediency of discarding all composite species, since everybody admits that either with species or genera some member of the original *melange* must conserve the original name unless all be synonymous with earlier names. It seems to me that the case may be summarized thus:

1774. Müller described as *H. fulva* a composite of two species (*Hygromia bidentata plus Euconulus fulvus* of modern authors).

1791. Gmelin eliminated *H. bidentata* from the composite by his unmistakable diagnosis and reference.

1801. Draparnaud recognized the composite nature of Müller's *H. fulva* and restricted that name to the *Euconulus*, which he well described and later figured.

I venture to submit the opinion that no action by Montagu or any other subsequent author should affect the status of either of the two species in question. *Euconulus fulvus* therefore should stand.

[1] Land and Fresh Water Mollusks of Alaska and adjoining regions, Harriman Alaska Expedition, Vol. xiii, p. 40.

DESCRIPTION OF A NEW PLEUROBEMA.

BY L. S. FRIERSON.

PLEUROBEMA TOMBIGBEANUM n. sp. Plate III, figs. 3, 4.

Shell short, triangular, thick, solid and heavy; truncated in front, roundly pointed behind at the post-base. Beaks high and incurved, their sculpture not seen. Post ridge rounded, and close to the post margin. The sides are slightly flattened just in front of the post-ridge, and an inflated, raised area extends from the beaks to the anterior base. This area is to a considerable degree concentrically sulcated, the sulci becoming obsolete behind, where it becomes striated; epidermis rayless, dark reddish brown or having faint greenish rays near the beaks. Lunule triangular, and membranaceous. The shell is markedly flattened in front, half way from beaks to base, showing a sort of so-called "secondary lunule." Nacre white, to rose color, and iridescent. Muscle scars well impressed, and separate. Beak cavities shallow. In the left valve there are two low, thick curved laterals, somewhat striate, and a stout, upright, bifid, striate, acuminate cardinal. In the right valve a single low, stout curved lateral upon a very wide heavy plate, or shelf, and a single wedge-shaped cardinal arising from a pit surrounded by a semicircular, low ridge. Cardinal plate thick, on the inner surface of which may be noted the dorsal muscle scars.

Length 48, alt. 40, diam. 32.3 mm.

Length 41, alt. 39, diam. 27.5 mm.

Tombigbee river. Types from Demopolis, Marengo Co., Alabama, in coll. Frierson and A. N. S. Phila. Also found at Columbus, Mississippi.

The shell may be mistaken by the casual observer, for a small *Quadrula pyramidata*, Lea, but may easily be distinguished by its smaller size, and especially its shallower beak cavities, lower beaks, and less pronounced sulcus from beak to post base. It seems a rather rare shell in the Tombigbee and Alabama Rivers. Four and a half specimens were received in three "envois" from the former river. Mr. Bryant Walker informs me that he has two specimens, from the Alabama River. One from the collection of Dr. Lewis, and labeled by him "*U. plenus*," and the other received

from Mr. R. E. Call, and placed among his "*pyramidata.*" Mr. William A. Marsh has examples, which have been labeled "southern variety of *pyramidata.*" Mr. Walker thinks the shell is however a *Pleurobema*, rather than a *Quadrula* and he places it in the scheme of classification next to *Pleurobema taitianum*, Lea. Compared with that species, ours is less convex, with a more or less distinct sulcus back of the convexity. Uniologists having southern *pyramidata*, may perhaps find specimens of *P. tombigbeanum* in the lots.

SOME NEW BRACHIOPODS.

BY WM. H. DALL.

During the researches of the U. S. S. Albatross party in 1906 a good many brachiopods were obtained, and the range of some known species much extended. The examination indicates that two species of those obtained are undescribed. Diagnoses are now given and figures are in preparation.

Terebratula (*Liothyris*) *sakhalinensis* n. sp.

Shell large, solid, of a rather dark and ruddy brown color and nearly smooth surface which bears faint concentric lines of growth and usually fainter, irregularly radial impressed lines on the anterior portion of the shell; valves moderately convex, the anterior margins slightly flexuous, the middle of the ventral valve is slightly squarely impressed and produced, the extension fitting into an analogous excavation in the dorsal valve; beak stout, moderately recurved, usually much eroded, with a large, entire foramen; the deltidial plates form a solid arch with no mesial groove; internally a thickened collar or short tube surrounds the peduncle, and an evident, but not prominent, short septum extends mesially about 2 mm. from the collar forward, in one specimen. Hinge of the ventral valve solid, with no props to the dental processes; in this valve the pallial sinuses exhibit two strong parallel trunks which extend nearly to the anterior margin before they begin to bifurcate; the genital glands extend as a fine, brown, irregular reticulation over the main cavity of the sinuses outside the inner line of the respective trunks on either side; dorsal (or hæmal) valve with a small but evident cardinal

process; the dental processes small and narrow; the loop is peculiar, the two supporting arms are appressed and soldered to the wall of the valve for a distance of 8 or 9 mm., so that the loop appears to spring from the valve and not from the hinge; it abruptly bends upward at a point about 12 mm. in front of the beak, forming a very wide, slender, frail, almost flattened loop with short triangular crura; the width of the loop is about 12.5 mm., the height of its arch about 3 mm., while the crura, which are curved inward parallel with the limb of the arch, are about 3 mm. long. A mesial septum, low and narrow but distinct, extends forward as far as the anterior edge of the adductor scars; the pallial margin carries minute setæ, which do not project beyond the edge of the valve. Length of ventral valve 45, breadth 34.5, max. diam. of shell 26 mm.

Dredged on the southeast coast of Sakhalin Island, Okhotsk Sea, in 64 to 100 fathoms, bottom temperature 30° F. Type, U. S. N. Mus., 110, 786.

The remarkable loop of this species is sufficient to distinguish it from any other of the genus; the characters mentioned are found in all the specimens.

Laqueus morsei n. sp.

Shell thin, smooth, polished, ruddy brown, rounded lozenge-shaped, somewhat attenuated in front up to a 10 mm. wide truncation; ventral valve with a short beak, entire foramen and short, wide, flattened area; deltidial plates united, but showing a groove at the junction; dental processes short, triangular, strong, supported by strong props with deep funnel-shaped cavities behind them; pallial sinuses with two inner trunks bifurcating at the anterior third of the valve, and two outer ones branched on the outer side from the beginning; genital glands in two longitudinal lines on each side extending along the middle of the main trunks of the sinuses and barely distally bifurcated; dorsal valve with a small but well developed hinge-plate, but no cardinal process or cavities under the dental processes; the septum is short and delicate; the loop normally formed but extremely slender, except the bight of the recurved portion, which is much wider than the rest; the valves meet in a nearly uniform plane, an extremely faint indication of a truncation in front forms the only approach to a flexuosity. Length of ventral valve 32.5, of dorsal valve 29.0, breadth 30.5, diameter of shell 18.0 mm.

Dredged at station 4,860 in the Japan Sea, in 122 fathoms, mud and stones, bottom temperature 34° 1 F. U. S. N. Mus. 210,800.

The species is named in honor of Prof. E. S. Morse of Salem, whose work on the brachiopods is well known. The most nearly related species is *Laqueus mariæ*, A. Adams, which is more ovate, with a narrower and more recurved beak, the genital glands differently distributed, and the mesial septum of the dorsal valve, long, high, and prominent; reaching to the anterior fourth of the valve, while in *L. morsei* it barely reaches the middle of the valve.

A white variety (*albida*) of *Waldheimia* (= *Eudesia*) *raphaelis* Dall, was also dredged, the specimens being more compressed laterally and with sharper anterior flexures than in the type. A dwarf form of the same species with all the characteristics of the adult, except that it measures 17 mm. long instead of 37, was dredged in Kagoshima Gulf. The normal adults of the species show little or no flexuosity anteriorly, until nearly full grown, but the dwarf referred to possessed them in perfection.

A NOTE ON HELIX HORTENSIS.

BY OLOF O. NYLANDER.

I have been much interested in your articles on *Helix hortensis* in America. When a small boy they were among my choicest playthings and I gathered large numbers of them together with *H. nemoralis* in south-eastern Sweden.

In 1899 among a lot of marine shells collected at Grand Manan, and given to me for identification were three land shells. One specimen had five narrow, dark brown bands on a light yellow ground, a common form of *Helix hortensis;* both were of larger size than any specimens in my collection from Sweden, Germany and England. One specimen is of a rich yellow color, comparing in every way with European specimens in my collection. The third specimen was a young shell, light yellow in color and like the plain-colored *Helix hortensis* of the Maine coast. Mrs. S. Page who collected the specimens, informed me that they were plentiful on the Island of Grand Manan, her native home. As there is so much

speculation relative to the origin and distribution of *Helix hortensis*, in America, I will state that in my opinion they were introduced by the early French settlers in Canada, at Gaspé and along the St. Lawrence River; and that their distribution only along the coast is due to the more favorable conditions. The long cold winters—sometimes commencing in September and lasting into the middle of May in Canada and Maine, are too severe and long for *Helix hortensis* to spread over the interior. Along the coast, and on the islands, the winters are not as long or as intensely cold as in the interior. I have gone over a very large part of northern Maine and a good part of New Brunswick and have never seen *H. hortensis*.

I have collected *Helix hortensis* at Hörte and Sherlotenlund on the south coast of Sweden within a few steps of the water edge of the Baltic Sea.

A NEW WEST INDIAN NITIDELLA.

BY WM. H. DALL.

During a recent visit to Cuba Mr. John B. Henderson, Jr., collected a few marine shells from the rocks along shore, between tides, at Ensenada de Cochinas, on the south side of the island. Among them was the following species which I have been unable to identify among the described forms of the genus.

Nitidella hendersoni n. sp.

Shell thin, fusiform, with an elongate, very acute spire, and about eight whorls; nucleus minute, white, smooth; subsequent whorls flattish with an appressed suture, pinkish near the nucleus, later becoming translucent with dark chestnut-brown lineolations, zigzags or dots, frequently with white, protractive, oblique flammulations at the suture of which the anterior margins are bordered with a dark chestnut line; also on the periphery is often a narrow articulated band, of white and brown spots; the surface is covered with a conspicuous greenish periostracum, which on the body whorl is elevated in axial lamellæ not close enough to give a velvety effect but separated by wider polished spaces; surface nearly smooth under the periostracum, polished, with faint indications of fine axial or revolving striæ; on the base there are numerous spiral grooves which

become stronger and channeled near the end of the nearly straight canal; aperture white, within purplish; outer slightly thickened, not reflected, smooth within; posterior angle of the aperture grooved and produced a little, with a subsutural obscure callosity on the body which elsewhere has the surface smoothly erased, edge of the pillar with one faint and one very strong marginal fold; operculum normal. Alt. of shell 19, of last whorl 13.5, of aperture 10, max. diam. 8.0 mm. Found in crevices of the rocks a little below low-water mark.

MOLLUSCA OF KEENE, NEW HAMPSHIRE.

BY R. D. WALKER AND WM. H. COOLIDGE, JR.

The shells that comprise this list were found in Keene, N. H., by the late George Alexander Wheelock, and form a small part of the extensive general collections which he made. The list is perhaps worth publishing as local data in regard to the shells of Keene and the surrounding regions. Mr. Wheelock spent almost his entire life in Keene (1816–1906) investigating the natural history of Monadnock. The determination of the species is through the kindness of Mr. Charles W. Johnson.

Planorbis parvus Say.
Planorbis bicarinatus Say.
Planorbis campanulatus Say.
Segmentina armigera Say.
Lymnea humilis Say.
Physa heterostropha Say.
Aplexa hypnorum.
Succinea ovalis Say.
Polygyra albolabris Say.
Polygyra fraterna Say.
Zonitoides arboreus Say.
Pyramidula cronkhitei anthonyi Pils.
Lyogyrus granum Say.
Amnicola limosa Say.
Unio complanatus Sol.
Alasmodonta undulata Say.
Lampsilis nasutus Say.
Anodonta cataracta Say.
Sphaerium rhomboideum Say.
Sphaerium secure Prime.
Sphaerium partumeium Say.
Sphaerium simile Say.
Pisidium variabile Prime.
Pisidium compressum Prime.

These specimens are in the Thoreau Museum of Natural History, Middlesex School, Concord, Massachusetts.

NOTES.

THE VERRILL COLLECTION.—Prof. A. E. Verrill of Yale University has sold to the University his great collection of marine invertebrates, acquired during his work for the United States Fish Commission in the 16 years from 1873 to 1887. The collection is the duplicate of one secured at the same time and since transferred to the National Museum of the Smithsonian Institution at Washington.

FORMATION OF EPIPHRAGM BY LYMNÆA PALUSTRIS (Müller). —A few days ago while collecting fresh-water shells in the dry bed of a pond near Alum Rock Park, San José, the author found several live specimens of a form of *Lymnæa palustris* Müller lying on the dry mud surface with the aperture sealed down by thick dried mucous and withdrawn into their shells half a whorl. The pond usually contains water at least half the year but on account of the dry spring has contained none since April 1st at least. The bed is thinly covered with tall tulas so that the shells were not in the direct rays of the sun. This form is the only one which occurs in the lake and dead shells up to barely mature are abundant, and some larger. —HAROLD HANNIBAL, San Jose, Cal.

EXOTIC VIVIPARA IN CALIFORNIA.—Amongst the fresh-water molluscan fauna of the "Artesian Belt," between San José and San Francisco Bay, is a large operculate edible snail introduced by the Chinese fifteen or twenty years ago. 4 mm. when born, carinate till mature, 6 months 20 mm. Occasionally in sub-brackish water, grows as large as a duck's egg. Plain yellow-green or with spiral fringes of epidermis.

Specimens were sent to Dr. Dall, who identified it as *Vivipara lecythoides* Bens.

It is very common where planted, but spreads slowly.

In the NAUTILUS XV, p. 91, is a reference to *Vivapara stelmaphora* Bgt., from a dry bed of a lake or pond "at the foot of Mt. Hamilton." The author has been over the San José, Mt. Hamilton road collecting, and of the four lakes and ponds on the route only one, on the Grant ranch in Hall's Valley, appears to answer the description, as it had been dry at the time that article was written for

several years. The fauna was exactly the same as in the neighboring parts of Santa Clara Valley, except extremely large, and contained not a sign of an operculate snail of any kind, nor did the son of a neighboring rancher know of any such form, though he knew the other species by sight. The other ponds were no better. Either the locality given was incorrect or the species was killed out by the drying-up of the lake while the other forms were not for some reason. Certainly it does not occur there at present for no traces could be found.—HAROLD HANNIBAL, San José, Cal.

PUBLICATIONS RECEIVED.

A NEW SPECIES OF CAVOLINIA, WITH NOTES ON OTHER PTEROPODS. By WM. H. DALL (Smithsonian Misc. Coll., Vol. 50, Jan., 1908). *Cavolinia couthouyi*, n. sp., from Fiji Is. and New South Wales.

GONIDEA ANGULATA LEA, WITH DESCRIPTION OF A NEW VARIETY. By WM. H. DALL (Smiths. Misc. Coll., Vol. 50, Jan., 1908). *G. a. haroldiana* is a new form from Guadalupe Creek, between San José and San Francisco Bay, "remarkable for the almost total absence of lateral angulation," etc.

NOTES ON THE FRESH-WATER MOLLUSK PLANORBIS MAGNIFICUS AND DESCRIPTIONS OF TWO NEW FORMS. By PAUL BARTSCH (Proc. U. S. Nat. Mus., Vol. 33, pp. 697–700). *Planorbis magnificus* Pilsbry occurs in Greenfield Pond, near Wilmington, N. C., where it is rather scarce and local. *P. eucosmius*, n. sp., was found in the same pond. It is very close to *P. bicarinatus striatus*, but distinguished by having two chestnut bands. *P. eucosmius vaughani*, n. subsp., is from Burke's Place, La. All are illustrated with photographic figures.

THE PHYSIOLOGY OF THE NERVOUS SYSTEM OF THE RAZOR-SHELL CLAM, ENSIS DIRECTUS CONRAD. By GILMAN A. DREW (Journal of Experimental Zoölogy, V, No. 3, March, 1908). Among other interesting conclusions, Dr. Drew finds that "the

pedal ganglia are apparently dependent upon the cerebral for initiative." When isolated, stimulation causes only local responses. Impulses may pass in both directions through any of the commissures and connectives. Impulses may be sent by roundabout connections when the usual connections are destroyed.

First Additional Catalogue of Land Shells of Japan. By Y. Hirase, Kyoto, 1908. In this list of 24 pages Mr. Hirase catalogues the species and varieties from Japan, the Bonin and Loochoo Islands and Formosa, obtained since the publication of his former list. It is interesting as showing the results of the latest work on these wonderfully rich faunas. Copies of the catalogue will be sent free, we believe, to those interested in the collection of Japanese shells. A handsome plate illustrates various new or interesting species.

Zoological Record, Vol, xliii, pt. viii, Mollusca.—By E. R. Sykes, completed by S. Pace and R. M. Pace. This complete record of all that has been published on Mollusca for the year 1906 together with every generic and specific name used, is indispensable to all working conchologists. The part containing 103 pages can be obtained for 4 shillings of Harrison & Sons, 45 St. Martin's Lane, London, Eng.

The Williams Collection of Shells.—By George Halcott Chadwick, Chicago, Ill., 1908. A brief account of the conchological cabinet of Mrs. Alice L. Williams, which contains so many rare and beautiful shells. It is undoubtedly the finest private collection in America. The collection contains 26,000 shells, "a number unexceeded, I believe, by any private shell cabinet in America since the day of John Jay. While the collection is rich in species representing almost every family, one naturally turns to those gems of the sea, the Cypræidæ. Here we find *Cypræa broderipi*, the only one in America, *C. nivosa*, *castanea*, *chrysalis*, *coxeni*, *crossei*, *similis*, etc., etc., while species considered by many rare are represented by series to show variation. There are 10 *C. aurantia*, 10 *decipiens*, 10 *thersites*, 7 *scotti*, 4 *umbilicata*, etc. Among the Conidæ is enthroned *Conus gloria-maris* while the rare

cervus is also there. The beautiful Volutidæ are represented by many species one scarcely sees in a lifetime. *Pleurotomaria beyrichii* is also among the treasures, but space will not permit us to go into details. It has been admirably described by Mr. Chadwick, who says: "My desire in this writing is to make this remarkable collection better known. It has been a labor of love, and I can wish for those who read no greater pleasure than to come under the fascinating spell of this great collection. It deserves a place in some great hall of science, and it is Mrs. Williams's hope that it may some day be thus installed through public or private munificence."

Descriptions of new species of mullusks from the Pacific Coast of the United States, with notes on the other mollusks from the same region. By William Healey Dall (Proc. U. S. Nat. Mus. vol. 34, pp. 245–257. Numerous new species and subspecies chiefly discovered by Dr. R. H. Tremper, Messrs. Herbert W. Lowe, F. W. Kelsey, and the U. S. Bureau of Fisheries, are described, with notes on previously known forms.

Smell the dominant sense in Diabrotica 12-punctata and Limax maximus. By Robert E. C. Stearns. (Proc. Biol. Soc. Washington xxi, pp. 137–140). *Limax* is guided to its food by smell. Salt liberally strewed on the floor is recommended as a check to their depredations.

On the synonymic history of the genera Clava Martyn and Cerithium Bruguiere. By W. H. Dall. (Proc. Acad. Nat. Sci. Phila. 1907, pp. 363–369). The history of these old names is fully exposed and various errors in matters of fact in M. Cossmann's review of the Cerithiacea are pointed out.

New and characteristic species of fossil mollusks from the oil-bearing tertiary formations of Santa Barbara Co., Cal. By Ralph Arnold. (Smith's Misc. Coll. vol. 50, pt. 4. 1907). Numerous interesting fossils from Eocene, Miocene and Pliocene horizons are described and well illustrated. Among them are *Venericardia planicosta* Lam., from Little Falls, Washington, "the most widespread and characteristic eocene species in the world," *Lymnæa alamosensis* n. sp., from the pliocene of Los Alamos Valley.

The Nautilus.

Vol. XXII. AUGUST-SEPTEMBER, 1908. No. 4-5.

MISCELLANEOUS NOTES ON CALIFORNIAN MOLLUSKS.

BY S. S. BERRY.

A specimen of *Cypræa spadicea* Gray has recently been brought to the writer's notice by Mrs. C. H. Fackenthall, of Pacific Grove, who some years ago found it alive on Chinatown Point, Monterey Bay. This extends the known range of the species many score of miles beyond the most northern locality which has previously been recorded.

Mrs. Fackenthall also collected in March, 1907, over sixty specimens of *Ianthina exigua* Lam. where they had been washed ashore near Point Pinos. This is a new locality for this species likewise.

Another *Ianthina*, which is apparently the *I. globosa* of Swainson, and is new to the Californian fauna, was found in considerable numbers at Oceanside, San Diego county, by Mrs. T. E. N. Eaton and Miss Grace Eaton in the summer of 1906. This species was found in company with *I. exigua* and another undetermined form of the same genus (*I. communis*?) cast up on the sandy beach, and for the most part still retained the animals.

* * * * * * *

In July, 1903, the writer made a small collection of fossils from the pleistocene deposit which forms the cliff just west of the bathhouse at Santa Barbara, among which many of the species are of interest because not included by Arnold in his lists[1] of the mollusks of the Santa Barbara pleistocene. Such species are marked with an asterisk. One or two forms are likewise entirely new to the formation.

[1] Paleontology and Stratigraphy of San Pedro, p. 52 q. v.

Margarita pupilla Gld. Several.
* Margarita optabilis knechti, Arnold. One specimen.
* Calliostoma canaliculatum Mart. Several juv.
Leptothyra bacula Cpr. Not rare.
* Leptothyra carpenteri Pils. Not rare.
Leptothyra paucicostata Dall. Not rare.
* Acmaea mitra Escb. Two juv.
* Acmaea (sp.). One juv.
Natica clausa B. and S. Young specimen and opercula.
Crepidula navicelloides Nutt. One specimen.
Crepidula adunca Sby. Two examples.
Rissoa acutilirata Cpr. Two specimens.
*Rissoa (sp?). One example.
*Diala marmorea Cpr. Several.
Lacuna compacta Cpr. The most abundant form.
Bittium asperum Gabb. Common.
Bittium (quadrifilatum Cpr.?). Common.
Bittium (sp.). Common.
*Epitonium (Opalia) borealis Gld. One specimen.
Ocinebra perita Hds. Several.
*Ocinebra interfossa Cpr. One specimen.
*Ocinebra lurida Midd. *var.* tending toward Carpenter's *var.* munda. Several.
*Ocinebra (sp.). One specimen.
Boreotrophon gracilis Perry. One example.
*Boreotrophon stuarti Smith. One example.
*Boreotrophon stuarti praecursor Arnold. Several.
Amphissa corrugata Rve. Common.
Columbella tuberosa Cpr. Common.
*Nassa mendica cooperi Fbs. One example.
Fusus robustus Trask? One example.
Fusus (sp.). Several.
*Mitramorpha filosa intermedia Arnold.
[*Note:* This form was likewise found in a living condition by the writer at Pacific Grove, Cal., in April, 1908.]
Clathurella conradiana Gabb. Two specimens.
*Tornatina cerealis Gld. Two examples.
*Dentalium indianorum Cpr. One perfect adult specimen.
*Psephidea (ovalis Dall?). One valve.

Venericardia ventricosa Gld. Abundant.

Pecten jordani Arnold. Fragments and two juv.

Pecten caurinus Gld. Fragments.

Pecten (sp.). Fragments.

Pecten hastatus Sby. Several valves.

*Monia macroschisma Desh. One valve.

*Glycymeris barbarensis Conr. One valve.

Strongylocentrotus purpuratus Stimp. Fragments of the test and loose spines of this sea-urchin.

*Platidea anomioides Scacch. One perfect shell probably referable to this species was found which agrees well with specimens from San Pedro Bay (200 fathoms), except that the foramen is relatively smaller and the posterior and anterior angles are more acute.

* * * * * * *

In the Proceedings of the U. S. National Museum, Vol. XXX, Messrs. Dall and Bartsch propose the specific name *montereyensis* for the preoccupied *Turbonilla gracillima* of Gabb. The authors must have overlooked the fact that Dr. Cooper in his Monterey list published in the American Journal of Conchology for 1870 likewise noticed the untenability of Gabb's name and rechristened the species *Chemnitzia gabbiana*, so that this name having priority must stand as *Turbonilla* (*Chemnitzia*?) *gabbiana* (J. G. C.).

* * * * * * *

Nassa perpinguis, var. *bifasciata*, *nov.* Among the mollusca collected recently at San Pedro by various collectors has been a color form of *Nassa perpinguis* Hds., which is strikingly distinct and is certainly worthy of a varietal name if color forms must be named. It differs from the ordinary form in the presence of two broad spiral bands of a deep chestnut color in abrupt contrast to the grayish-buff ground color of the shell. One of these bands is situated just below the suture, one about the periphery, and occasionally a fainter band makes it appearance at the extreme base of the last whorl. The bands vary considerably in width, but as yet I have seen no specimens having but a single band.

Additional Notes on Monterey Mollusks.

In my paper on the Molluscan Fauna of Monterey Bay, California, which appeared in the numbers of this magazine running from June to September, 1907, there were a few unavoidable errors and omis-

sions which may well be remedied. The following corrections should be made:

June No., p. 18, near top. *304* species were listed; not *394*.

P. 18, near bottom of page. "*Terebratulina*" *transversa* is a misprint for "*Terebratalia.*"

P. 19. The identification of *Barbatia gradata* is a very doubtful one and the species should probably be removed from the list.

July No., p. 35. "*Cregires*" *albopunctatus* should be *Aegires.*

Aug. No., p. 43. *Odostomia* (*Ividea*) *navisa* should be changed to *O.* (*Ividia*) *navisa delmontensis*, Dall & Bartsch. New subsp.

P. 43. "*Triforis adversus*" is not this species but an undetermined form.

P. 43. "*Seila assimilata* C. B. Adams" was identified according to the common misconception of that tropical species. My specimens should be listed as "*Seila montereyensis* Bartsch," n. sp. One of the co-types came from this lot.

P. 44. "*Rissoina*" *purpurea* is a *Rissoa.*

Sept. No., p. 52, near end of article. Should read as follows: ". . . of Scala (*nine* species), and of the Pyramidellidae (*eighteen* species)," etc. This last figure includes the additional forms enumerated below.

The following species and varieties have been determined from the same lot of material since the publication of the main report:

Adula stylina Carpenter. 12 fathoms; not rare with the other borers in the hard mud.

Cadulus quadrifissatus Carpenter. 12 fms.; one specimen.

Actaeon punctocaelatus Carpenter. 12 fms.; young specimens only.

Epiphragmophora sequoicola J. G. Cooper. Big Trees Station, near Santa Cruz; one immature specimen.

Epiphragmophora arrosa Gould. Big Trees Station, near Santa Cruz; several examples.

Epiphragmophora exarata Pfeiffer. Near Santa Cruz. Specimens were also seen from various localities in the Santa Cruz mountains and from Watsonville.

Epiphragmophora californiensis nickliniana Lea. Big Trees Station, near Santa Cruz.

Polygyra columbiana Lea. Big Trees Station, near Santa Cruz.

Polygyra columbiana armigera Ancey. One specimen found a few miles south of Pacific Grove in the pine woods.

Murex (*Ocinebra*) *interfossus* var. *muricatus* Cpr. Pacific Grove; not rare at low tide.

Turbonilla (*Turbonilla*) *gilli delmontensis* Dall and Bartsch. 12 fathoms; the type lot.

Turbonilla (*Strioturbonilla*) *stylina* Carpenter. 12 fathoms; one specimen.

Turbonilla (*Pyrgolampros*) *berryi* Dall and Bartsch. Two or three specimens, including the type, dredged in 39 fathoms.

Turbonilla (*Pyrgiscus*) *canfieldi* Dall and Bartsch. 12 fms.; the type lot.

Turbonilla (*Pyrgiscus*) *morchi* Dall and Bartsch.? One specimen dredged in 29 fathoms was doubtfully referred by Messrs. Dall and Bartsch to this species.

Cancellaria crawfordiana Dall. Specimens brought in by the fishermen.

The foregoing bring the total collection, after due corrections, up to about 318 named species and varieties, including types or co-types of fourteen new species and two subspecies, besides nine other species not previously described, but the types of which were collected elsewhere.

LAND SHELLS OF THE OKI ISLANDS, JAPAN.

BY H. A. PILSBRY AND Y. HIRASE.

The Oki Islands, in the Sea of Japan north of western Hondo, consist of one large and three smaller islands and several islets, the the whole group about 23 miles long. Saigō is the chief harbor. It is on the southeast side of the largest island, which has a diameter of about 10 miles. The highest elevation is said to be about 1700 feet.

The mollusks of Oki have not before been noticed.

Out of 24 species of land shells there are 9 forms which have as yet been found only on the Oki Islands. Two of these forms are reckoned to be of specific value; the other seven are subspecies of forms found on the adjacent portions of the Main Island of Japan, or in one case on Tsushima, though the two Ganesellas are so distinct that they might with some reason be ranked as species. All of the other forms occur on the Main Island of Japan.

The very close relation of the fauna of the Oki Islands with that

of the adjacent Main Island places these islands in harmony with Sado, Tsushima, Iki, and other islands in the Sea of Japan and Korea Strait, all of which have faunas which show them to have been joined at no remote period to the large islands of Japan.

In the following list, the forms peculiar to Oki are marked with an asterisk (*).

CYCLOPHORIDÆ.

Alycæus melanopoma Pils. (?). Nakamura.

Diplommatina cassa Pils. var. Saigō.

* *D. okiensis* Pils. & Hir. Nakamura. A subspecies of this snail, *D. o. tsushimana*, occurs on Tsushima.

HELICIDÆ.

Eulota (*Euhadra*) *peliomphala* (Pfr.) var. Nakamura.

Eulota (*Euhadra*) *senckenbergiana* (Kob.) var. Nakamura.

Eulota (*Euhadra*) *callizona minor* Gude. Nakamura.

Eulota (*Plectotropis*) *æmula* Gude. Nakamura.

* *Trishoplita cretacea pergranosa* Pils. & Hir. Nishinoshima.

Trishoplita endo Pils. & Hir. Nakanoshima.

* *Ganesella ferruginea okiensis* P. & H. Nakamura.

* *Ganesella myomphala euomphala* P. & H. Nakamura and Chiburijima.

Chloritis tosanus okiensis P. & H. Nakamura.

CLAUSILIIDÆ.

Clausilia (*Hemiphædusa*) *harimensis* Pils. Nakamura.

Clausilia japonica vespertina Pils. Nishinoshima.

Clausilia japonica ultima Pils. Nakamura.

Clausilia nishinoshimana Pils. Nishinoshima.

ZONITIDÆ.

Macrochlamys subelimatus P. & H. Nakamura and Daimanji-yama.

Microcystina vaga P. & H. Nakamura.

Microcystina ceratodes (Gude). Nakamura.

Kaliella ruida Pils. var. Nakamura.

Kaliella fraterna Pils. Nakamura.

* *Kaliella okiensis* Pils & Hir. Nakamura.

ENIDÆ.

Ena reiniana (Kob.) var., shaped like *ugoensis*. Nishinoshima.

AURICULIDÆ.

Carychium nipponense Pils. Saigō.

The descriptions of new species and subspecies follow:

Diplommatina okiensis n. sp.

The lower half of the shell, comprising two whorls, is cylindric, the upper half tapering in a rather long cone with straight sides. Adult shells are generally red-brown, rarely whitish, but the young are nearly white. There are nearly 7 moderately convex whorls, the penultimate, seen from the back, being the largest. The last whorl ascends in front, and has a strong, rather sharp ridge or collar a short distance behind the peristome, and preceded by a rather wide opaque whitish streak. The constriction is slight and median in front. The whole shell, after the smooth apex, has a sculpture of very fine, delicate, oblique, moderately close thread-striæ. The aperture is nearly circular, the parietal callus having a slightly thickened edge, reaching up nearly to the suture. Peristome well reflexed, usually very slightly angular at the foot of the columella. Palatal plica very short, half covered by the parietal callus. Columellar tooth moderately strong, deeply placed, thin but rather high within. Internal parietal lamella strongly developed.

Length 4, diam. 2 mm.

Nakamura, Oki. Types no. 95663 A. N. S. P., from no. 296 *c* of Mr. Hirase's collection.

This species differs from *D. paxillus* (Gredler) by its strongly developed collar. It is closely related to the common Japanese *D. collarifera* Schm. & Bttg., but that species has a much longer palatal plica, a decidedly thicker and stronger columellar lamella inside, and only a weak internal parietal lamella.

Trishoplita cretacea pergranosa n. subsp.

The shell is depressed-conic with obtusely subangular periphery, thin, whitish corneous, with a broad brown band on the base, extending from just below the periphery nearly to the umbilicus, and a narrow brown band above the periphery, ascending the spire above the suture. The surface has a minute sculpture of fine, somewhat waved or irregular striæ, which are minutely and very elegantly granulose; no distinct spiral lines.

Alt. 8.3, diam. 13.3 mm.; whorls $5\frac{1}{2}$.

Nishinoshima, Oki. Types no. 95840 A. N. S. P., from no. 1575 of Mr. Hirase's collection.

This snail, of which only 7 examples were taken, is most nearly related to *T. c. bipartita* of Nagato province, which is less depressed,

less angular, and has no band above the periphery. The minute and very beautiful granulation is somewhat variable.

Ganesella myomphala euomphala n. subsp.

The shell is more depressed than *myomphala*, with the umbilicus open, though partially arched over by the dilated columellar lip, which, however, is not in the least impressed in the axial region. The form is much less depressed than *G. m. omphalodes.*

Alt. 24, diam. 36 mm.; whorls $6\frac{1}{2}$.

Alt. 23.5, diam. 35 mm.; whorls $6\frac{1}{2}$.

Alt. 22.5, diam. 31 mm.; whorls $6\frac{1}{2}$.

Nakamura, Oki. Cotypes No. 95835, A. N. S. P., from No. 1560 of Mr. Hirase's collection.

A smaller form of this subspecies was taken in small numbers (10 individuals) on Chiburijima, Oki. Two measure:

Alt. 18.2, diam. 24.5 mm.; whorls 6.

Alt. 17, diam. 23 mm.; whorls 6.

Ganesella ferruginea okiensis n. subsp.

The shell is much elevated, bullet-shaped, the outlines of the spire strongly convex; narrowly, obliquely umbilicate; rich chestnut-brown, encircled with a narrow yellow band at the periphery and ascending the spire above the suture; surface nearly lusterless, rather weakly marked with growth-wrinkles and minute spiral lines, some intermediate whorls of the spire punctate or subpapillose. Whorls convex, the last rounded periferally, convex beneath. Aperture very oblique, the upper and columellar margins subparallel; baso-columellar margin straightened, thickened within, the edge reflexed.

Alt. 19.5, diam. 17 mm.; whorls $6\frac{1}{3}$.

Alt. 17, diam. 16.2 mm.; whorls $6\frac{1}{4}$.

Alt. 17, diam. 15.5 mm.; whorls $6\frac{1}{3}$.

Nakamura, Oki. Types No. 95820, A. N. S. P., from No. 1564 of Mr. Hirase's collection.

This form is well distinguished by its high contour. It may prove to be specifically distinct, but for the present we prefer to attach it to the widely distributed *G. ferruginea* of the main island.

Chloritis tosanus okiensis, n. subsp.

Umbilicus wider than in *C. tosanus*, contained six times in the diameter of the shell. Hairs of the surface not so close.

Alt. 8.8, diam. 16.8, width of umbilicus 2.8 mm.

Nakamura, Oki. Types No. 95821, A. N. S. P., from No. 1567 of Mr. Hirase's collection.

Kaliella okiensis, n. sp.

The shell is perforate, conic, amber-colored, glossy, the spire conic with slightly convex outlines, perifery thread-carinate, the base convex. The surface is smoothish, above, with faint growth-lines, and minute radial striæ just below the suture on the intermediate whorls; the base having faint spirals, not close together. Whorls 6, convex, slowly increasing, the last having a narrow, thread-like periferal keel. Aperture semilunar, rather narrow, the peristome rather broadly dilated near the axial insertion.

Alt. 2.7, diam. 3.6, mm.

Nakamura, Oki. Types No. 95849 A. N. S. P., from No. 1568 of Mr. Hirase's collection. Also No. 1569.

This species stands near *K. sororcula*, but it differs in having the whorls crenulated below the suture on the spire.

A NEW AMERICAN PLANORBIS.

BY FRANK COLLINS BAKER.

PLANORBIS BICARINATUS PORTAGENSIS n. var.

Shell with the dorsal and ventral sides sharply carinated, the spire and umbilicus typically forming deep, cone-like depressions; sculpture of strong growth-lines and distinct spiral lines, as in *bicarinatus striatus;* aperture strongly auriculate, the upper and lower extremities forming a strikingly developed V-shape.

Height 8.00, breadth 14.00; aperture height 10.00, breadth 5.50 mm.

Height 8.00, breadth 13.00; aperture height 9.00, breadth 5.00 mm.

Habitat: Portage Lake, on Fish River, Aroostook County, Maine. (Collected by O. O. Nylander; types in collection of Chicago Academy of Sciences.)

This peculiar variety may be known by the strong keels on the shoulder and base and by the V-shaped upper and lower margins of the aperture, which produce a notably auriculate aspect. It was at first thought to be a form of Walker's variety *major*, but a comparison with specimens of the latter received from the author shows that the two are distinct varieties.

LAND SHELLS OF TANGULANDANG (TAGOLANDA.)

BY H. A. PILSBRY.

Tagolanda or Tangulandang is a small island between Celebes and Mindanao, about fifty miles from the N. E. extremity of the former, and between that and Sangi (Sangir). So far as I know, nothing has been known of its mollusks. A collector for Mr. Walter F. Webb, of Rochester, N. Y., took a number of land shells there, which show that the fauna has relations with both Celebes and Sangi. The list follows.

Cyclotus politus Sowerby.

Found also in Celebes, Flores, Timor and some other islands of the same region, but not north of Tagolanda.

Leptopoma tagolandense n. sp. Pl. IV, figs. 1, 2.

A species of the group of *L. manadense.* The shell is narrowly umbilicate, acutely carinate, slightly wider than high; typically corneous-whitish densely speckled with brown and encircled with a dark chestnut band below the periphery, but sometimes wanting this band. The brown spots are larger and rather regularly spaced just above the periphery and below the suture; the first three whorls are uniform yellowish-corneous or brown. Whorls $5\frac{1}{2}$, all rather strongly convex, the last having an acute, projecting periferal keel, below which it is moderately convex. The first half-whorl is smooth; then 5 to 7 fine spiral threads begin. On the fourth whorl interstitial spiral striæ appear, continuing to the end, the primary spirals retaining their prominence as subequally spaced cords among the fine spiral striæ of the later whorls. The base is finely striate the striæ slightly unequal. Aperture oblique, sub-circular; lip white, not continuous, the upper margin expanded, basal margin reflexed; columellar circular dilated. Alt. 14, diam. 15 mm.; width of aperture 8 mm.

This species differs from *L. menadense* in sculpture. It stands near *L. vexillum*, well figured by the Sarasins, but the last whorl is more convex above than below the keel (whereas *vexillum* is more convex below), and there are fewer major spiral cords, 5 to 7 on the upper surface of the last whorl, while *vexillum* has 10.

There is also a form without brown markings, the shell bluish-white, yellowish-white at the spire. This may be called var. *immaculata.* Some individuals have a dark chestnut band below the keel.

Obba marginata (Müll.).

Elsewhere found widely distributed in the Philippines. The var. *sororcula* Marts. in Celebes.

Helicostyla leucophthalma tagolandensis n. subsp. Pl. IV, figs. 5, 6, 7.

Shell smaller than *leucophthalma*, slightly more solid, the lip more broadly expanded; bluish-white with many light green revolving bands and lines on the last half or more of the last whorl. Whorls only $3\frac{1}{2}$.

Alt. 21, diam. 32 to 35.5 mm.

H. leucophthalma Pfr. was thought at first to be from Celebes, but the locality Great Sangi Island was pointed out by Ancey several years ago, and the Sarasins collected it there, and have figured the snail laying its eggs in a folded leaf, in their great work on Celebes (p. 204, plate 27). Pfeiffer described and figured *leucophthalma* as covered with a thin tawny cuticle, irregularly streaked, and having two narrow brown bands above, two wider ones on the base; and it measured, alt. 21–22, diam. 42 mm., whorls nearly 4. His description and figures are reproduced in Manual of Conchology, Vol. VII, p. 113, pl. 26, f. 16, 17.

The specimens I have seen from Great Sangi agree better with those described by Sarasins. The spire is transparent-white, as usual; the last whorl is covered with a chestnut or wood-brown or olive-brown cuticle, which is darkest behind the lip, and fades out to almost white at the beginning of the whorl. This cuticle is obscurely streaked with darker, and shows traces of darker spiral bands and lines. Around the axis there is a paler area. In another shell, a ground similar to that just described is cut into bands above the periphery by white spiral zones, and there is a large white axial area. These shells are figured, plate IV, figs. 3, 4. They measure 39 to 41 mm. in diameter. *H. leucophthalma* evidently belongs to the subgenus *Corasia*, not to *Crystallopsis*.

It is possible that Pfeiffer's types were from another island of the same group, or they may have been merely from another colony on Great Sangi. Such local color-races often exist in close proximity.

Xesta cincta (Lea).

Also found in Celebes, in several varieties.

PUBLICATIONS RECEIVED.

How Fulgur and Sycotypus Eat Oysters, Mussels and Clams. By Harold Sellers Colton (Proc. Acad. Nat. Sci., Phila., 1908). The behavior of specimens kept captive in a salt-water aquarium in the vivarium of the University of Pennsylvania has been studied by Mr. Colton. His observations contradict the prevalent impressions as to the feeding of conchs, and should lead to further work on the subject. We quote part of Mr. Colton's observations on *Fulgur (Sycotypus) canaliculatum*: "The *Sycotypus*

had not been fed for a month or so . . . . It attacked one of the oysters five minutes after I placed them with it. . . . The *Sycotypus* crawled on top of the oyster, which closed its valves. The conch waited two minutes when the oyster opened its valves. Rotating its shell on the axis of the columella through an angle of 70°, it thrust its own shell between the valves of the oyster and introduced its proboscis between the shells. Forty minutes later it left the empty shell.

"*Sycotypus* does not wedge the shells of *Mya* apart, because it can get at the soft parts without doing so, since the valves gap slightly. To test this I introduced an oyster that had had three-quarters of an inch broken from the margins of both valves on the end away from the hinge so that the valves appeared to gap. I found that *Sycotopus* attacked this one in the same manner as it attacked *Mya* and did not wedge the shells apart.

"*Fulgur* eating *Venus* is a much more complicated case. The conch (*Fulgur perversa* or *F. carica*) grasps the *Venus* in the hollow of its foot, bringing the margin of the *Venus* shell against its own shell margin. By contracting the columellar muscle it forces the margins of the shells together, which results in a small fragment being chipped from the shell of *Venus*. This is repeated many times and, finally, the crack between the valves is enlarged to a width of 3 mm. or more. The proboscis is normally about 5 mm. to 8 mm. in diameter. There are three ways in which it may get at the animal. First, it may flatten out its proboscis so that it will go through the crack; secondly, it may pour in a secretion between the valves which kills the clam, and, thirdly, it may wedge its shell between the valves of the *Venus*. By contracting its columellar muscle it may actually wedge the valves apart. *Venus* never opens its valves of itself when it is in the grasp of a *Fulgur*, while *Ostrea*, after the first shock, opens wide its valves as if no danger was near.

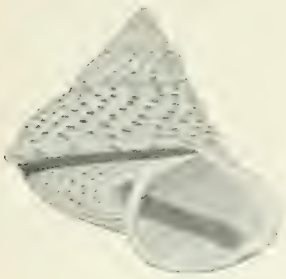
"*Fulgur* and *Sycotypus* often break their own shell when opening oysters and clams, and this accounts no doubt for the irregular growth-lines seen on their shells.

"This method of inserting the margin of a gasteropod between the valves of a Lamellibranch has been noticed before. Francois (1890) briefly reports that *Murex fortispina* has a special tooth on the margin of its aperture for the purpose of inserting between the valves of *Arca*. It may be that this manner of attacking the soft parts of bivalves is a very common habit of Prosobranch mollusks."

The several stages in the processes described are fully illustrated.

NOTE.

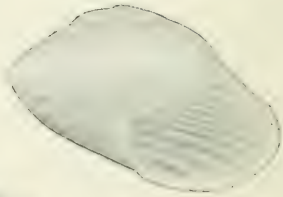
The scarcity of "copy" during the summer months has caused us to issue a single number for August and September. The usual number of pages for the year will be made up by enlarging a future number. Plate IV. will appear next month.



1

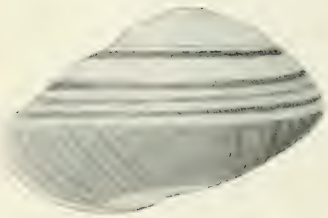
2

5



6

3



4

LAND SHELLS OF TANGULANDANG AND SANGI.

The Nautilus.

Vol. XXII. OCTOBER, 1908. No. 6.

SOME NOTES ON THE LOCOMOTIVE DISK OF STYLOMMATOPHORA.

BY V. STERKI.

During 1907 I made some studies and observations on the morphology of some of our land snails, and especially on the foot. The results were very incomplete and fragmentary; but the notes respecting the sole and "locomotive disk" appear to be of some interest, and a summary of them is here given.

Of about thirty-seven species, I had occasion to observe living animals, and of some of them preserved specimens could be compared. The results obtained are somewhat at variance with those published by other conchologists, which appear to have been obtained mainly from preserved material.

It may be mentioned that a piece of thin glass is conveniently used to let the snails creep on. In this way, the sole can not only be seen with the naked eye, but lenses and even strong doublets can be used, and the foot seen in both reflected and transmitted light. If kept on a slide, upside down, minute snails can be examined and observed under a low-power microscope. It is recommended to fasten a few small slips or narrow strips of glass on the glass plate, best a pair of them close together, in order to observe the shape and motions of the sole when detached from the even surface, while a snail creeps over these obstacles.

The majority of the snails showed locomotive waves on the under surface of the foot while creeping. On about one-third, none could be seen. The waves proceed from the posterior end, or from near

the same, following each other towards the anterior, but in some instances do not reach the latter. The number of simultaneous waves is various in the several species, genera and groups, but rather constant in one species; they also vary in extent, and may be faster or slower, regular or irregular, very distinct to more or less obscure. In most species, they are confined to a median zone of the sole, narrower or wider, corresponding with the so-called locomotive disk. In some species, resp. groups, that disk is marked off from the marginal zones by a more or less marked line, more or less distinct in alcoholic specimens. But in some the zones are not noticeable on the dead body, while in the living, creeping animal, the waves are very distinct and sharply restricted to the median zone. This was especially noticed in *Polygyra* (*Stenotrema*, *Triodopsis* + *Mesodon*), and in *Helix hortensis*, for which the existence of a disk has been denied; also in some of the *Zonitidæ*, *Agriolimax*, *Vertigo*, *Succinea*. But there are noticeable differences, as will be stated later on.

In a few snails, of various groups, the waves extend over the whole width of the sole, *e. g.*, in *Circinaria concava* Say, *Vallonia* sp., *Bifidaria armifera* Say. There are no marginal zones in these, so far as I was able to see, and it is probable that the muscles of the sole are different, comparatively wider than the others.

In a number of others, no waves could be seen, and no differentiated longitudinal zones. Such were: part of the *Zonitidæ*, such as *Gastrodonta ligera*, *Zonitoides nitidus*, *arboreus*, *minusculus*, all *Patula*, *Helicodiscus*, *Philomycus*. Moreover, it appears that at least in the *Zonitidæ* cited, the sole is of a formation different from that of, *e. g.*, the *Polygyræ;* it seems that an additional layer of tissue is superposed on the under surface of the foot. The surface has a different appearance, the sole seems thicker, and the double lateral lines, above the margins of the foot appear to point to the same conclusion. Unfortunately, I had no time to make exact anatomical and histological examination of these parts, but some anatomist may take the subject up.

It is interesting and significant that such differences are found among our *Zonitidæ*. It has been pointed out, long ago, by some scientists, that the family includes some widely different forms or types, with all similarity of the shells, and even the radula, etc. And it will be noted that, *e. g.*, *Gastrodonta* and *Zonitoides*, which were denoted as showing no locomotive waves, no longitudinal zones,

and a peculiar formation of the sole, are among those *Zonitidæ* which are provided with a dart sack and dart, while *Omphalina* and *Hyalina* (= *Vitrea*) are devoid of such. It is possible that the formation of the foot may add features of distinction between various natural groups of this complex family, and in close connection with it may be the presence or absence of a caudal mucus gland (and mucus pore).

Systematic Review.

ZONITIDÆ.

Omphalina fuliginosa Griff. Locomotive waves in a median zone which is marked off by slight superficial lines, which are slight furrows when the sole is detached from a surface. The waves are not as distinct as, *e. g.*, *Polygyra*, and apparently more remote from the surface of the sole.

Hyalina (*Vitrea*) *indentata* Say and *radiatula* Ald. Waves in a median zone, in the anterior $\frac{2}{3}$ or $\frac{3}{4}$, indistinct, and mostly not seen at all near the posterior end. The surface layer undulating forward and backward over [under] each advancing wave.

Gastrodonta ligera Say. No waves seen. Foot and sole as described above, for this and the four following species. A darkish median line is ill-defined and has nothing to do with a locomotive disk.

Zonitoides nitidus Müll., *arboreus* Say, *minusculus* Binn., *Euconulus chersinus* Say. No waves; no zones seen.

LIMACIDÆ.

Agriolimax campestris Binn. Waves in narrow median zone, following each other in rapid succession, about ten simultaneously, while the surface layer of the sole shows forward and backward undulation with each wave. When the animal proceeds slowly (for a snail!), the waves are more or less irregular, even undulating, and sometimes no waves can be seen when the animal moves very slowly. This has been noticed also on some other snails.

CIRCINARIIDÆ.

Circinaria concava Say. The waves extend over the whole width of the sole; the same was seen on a very small, young specimen; no zones seen.

HELICIDÆ.

Polygyra hirsuta, fraterna, tridentata, fraudulenta, inflecta, palliata, mitchelliana, thyroides, albolabris and var. *minor, profunda:* waves very distinct, in a rather sharply defined median zone, regularly proceeding from the posterior end to the anterior, about 7 or 8 simultaneously in *hirsuta* and *fraterna*, 10 to 12 in the large species. Marginal zones with fine radiating lines.

It may be noted here, in a general way, that the number of waves is easily over-estimated, and it is somewhat difficult to count them, if more than two to four.

Helix (*Tachea*) *hortensis* Müll. Zones plainly visible! the marginal areas rather narrow; waves, in the median, distinct.

Vallonia pulchella, excentrica, costata: no zones seen; waves extending over the whole width of the sole, rather fast, about four simultaneously. The waves can be seen in lateral view, in transmitted light.

NOTE.—There is a possibility, however, that in these and other minute snails, narrow marginal zones exist and have been overlooked, to which the waves are transmitted.

ENDODONTIDÆ.

Patula solitaria, alternata, perspectiva, striatella, Helicodiscus lineatus Say: no zones seen, and no waves. It seems that the formation and texture of the sole are rather different from those of *Polygyra*, and more like those of *Gastrodonta* and *Zonitoides*.

PHILOMYCIDÆ.

Philomycus carolinensis Bosc., and another species which is probably distinct: no zones, and no waves seen.

PUPIDÆ.

Bifidaria armifera Say. No zones seen; waves extending over the whole width of the sole, about four simultaneously, rather irregular, and often disappearing before reaching the anterior end, and apparently commencing anywhere, also stopping and quasi rebounding anywhere; in short, more irregular than in any other species. This seems to be concordant with the jerky motion of the animal.

Vertigo ovata Say. Sole with three zones, the median one widen-

ing towards the anterior end so that the marginals disappear. Waves distinct, in the median zone, two to three simultaneously.

Vertigo tridentata Wolf. Waves seen; other details in doubt.

SUCCINEIDÆ.

Succinea avara Say. Sole with three zones; waves in the median, 3–4, rapidly moving forward, each one drawing along parts of the marginals. The surface layer moves forward and backward, undulating, with every wave passing. When part of the foot is detached from its support, the waves can be seen there proceeding on the more or less contracted and folded sole.

S. retusa Lea. Three zones, median one with 4–5 waves.

PALUDESTRINA SALSA, PILSBRY.

BY REV. HENRY W. WINKLEY.

It seems odd that a species so widely distributed, and fairly abundant, should have escaped the eyes of New England collectors so long. Yet its dwelling-place is peculiar. A word as to where it occurs may be of interest. It was first noticed by the writer at a spot where a brook enters the marsh at Branford, Conn. The site is probably three miles inland from Long Island Sound, and the water at this spot must be fresh. Later I found it more abundant on vegetable matter in a ditch in the marsh near the railroad in Branford and a mile nearer the sound. The waters here would be brackish. I have not seen the locality where Mr. Owen Bryant found it at Cohasset. Last summer I located it in a pot hole in the marsh at Wareham, Mass. This locality showed it in a pot hole without an outlet. I have not seen it in such a place elsewhere. The locality mentioned in my last article in the NAUTILUS (vol. XXI, p. 75) where my daughter found it at East Wareham, was among flags near the border of the Agawam river. The character of the water may be understood from the fact that I was in mid-stream examining *Unio complanatus* when she found *P. salsa* in the same river. Last winter I took up a residence in Danvers, Mass., and have found *P. salsa* here. Two localities reveal it; both are spots where the water ebbs and flows, and not closed pot holes.

Danvers lies back of Salem and Beverly at the headwaters of a branching bay. A few days ago I made a trip to Plum Island. Leaving the train at Rowley, I found *P. salsa* in a small ditch close to the railroad station. A half-mile further down *Litorinella minuta* was abundant in closed pot holes, but *P. salsa* not there. I do not recall finding the two in company, yet they are often near neighbors. We now have a distribution of this species from the New Haven area in Conn., to Rowley, Mass., just north of Cape Ann, and very near the New Hampshire line.

A NEW CŒCUM.

BY REV. HENRY W. WINKLEY.

Cœcum Johnsoni n. sp.

Shell minute, tusk-shaped, slightly tapering, lightly curved. $2\frac{1}{2}$ mm. in length, $\frac{1}{2}$ to $\frac{3}{4}$ of a millimeter in diameter. Apex plug protrudes in a dome shape. Aperture circular, end of the tube at the apex is at right angles to the longer axis of the cylinder. Aperture end at an angle, sloping towards the convex side, color dull white to horn color, surface marked by lines of growth, but not ribbed.

Dredged at Woods Hole, Mass., on gravel bottom in 2 to 3 fathoms. Easily mistaken for *C. pulchellum*. In size, color and form it resembles that species but lacks the ribs, and the dome-shaped plug in the apex is not seen in *pulchellum*. Types in Winkley collection.

It gives me much pleasure to name this shell for one who has shown himself a lover of the science, and a friend to his fellow-workers, Mr. C. W. Johnson, of the Boston Society of Natural History.

A SMALL ADDITION TO THE KNOWLEDGE OF THE DANISH MOLLUSCAN FAUNA.

BY HANS SCHLESCH, COPENHAGEN.

About 15 miles north of Copenhagen on the beautiful coast of the Sound stands the pretty village of Rungsted, where many well-to-do people from Copenhagen have their summer villas. Between Rungsted and Horsholm (German Hirschholm) and a mile to the

west, where King Christian VI erected a castle, we find a woods called "Polehaven." It was formerly used as a park for the now demolished castle. In the edge of the woods opposite the railway station of Rungsted and in the meadow between the woods and Rungsted I found the species of mollusks mentioned below. My friend Mr. Niels Petersen has assisted me in collecting these.

Limax maximus Linné, is very rare. I have also found some other species of *Limax*, but up to now I have not been able to determine them.

Vitrina pellucida Müller, is very common.

Arion empiricorum Ferussac is found over the whole place.

Besides *Polita cellaria* Müller, some other species of *Hyalina* as *Conulus fulvus* Müller are found at both localities.

Punctum pygmaeum Draparnaud.
Patula rotundata Müller.
Vallonia pulchella Müller.
Vallonia costata Müller.
Trichia hispida Linné.
Monacha incarnata Müller.
Eulota fruticum Müller.
Eulota f. v. fasciata Moq. Tand.
Eulota f. v. alba-unifasciata Hesp.
Eulota f. v. abina.
Arianta arbustorum Linné.
Arianta a. v. trochoidalis Roffiaen.
Arianta a. v. roseolabiata Schlesch nov. var.[1]
Arianta a. f. scalaris. One specimen only.
Tachea nemoralis Linné.[2]
Tachea n. f. major.
Tachea hortensis Müller.
Tachea h. v. roseolabiata.
Tachea h. v. fascis-transparentibus (= *v. albina*).
Helicogena pomatia Linné.
Clausiliastra laminata Montagu.
Clausiliastra l. v. granulata Ziegler.
Pirostoma bidentata Strom.
Pirostoma b. v. septentrionalis A. Schmidt.
Pirostoma plicatula Draparnaud.
Pirostoma pumila Ziegler.
Napaeus obscurus Müller.
Vertigo antivertigo Müller.
Vertigo pusilla Müller.
Vertigo angustior Jeffreys.
Cochlicopa lubrica Müller.
Succinea putris Linné.
Succinea p. v. albina.
Succinea pfeifferi Rossmässler.
Succinea p. v. albina.
Carychium minimum Müller.

[1] The mouth brim is rose-colored as *Tachea hortensis* Müller var. *roseolabiata* Rare.

[2] Mr. Niels Petersen has given me some specimens found at Rungsted, the ribs of which are so marked that they look as if they belonged to *Tachea austriaca* Mühlfeldt.

MESESCHIZA GROSVENORII, LEA.

BY A. A. HINKLEY.

A few remarks on this subject in addition to the writer's notes in the NAUTILUS for May, 1901, may not be amiss. The Wabash river was visited in August of the present year, at several places in Posy county, Indiana. The writer was determined to find the form described by Dr. Lea under the above name if it still existed.

On the "Chains" where a stream of water passed with considerable current, the young *Angitrema armigera* were in large numbers on the under side of the rocks. Here the *Meseschiza* form was found quite plentiful, and some three hundred specimens were taken. It is a characteristic lot of young *Angitrema armigera*, with the exception of the notch in the lip, showing all the variations of color markings. The notch varies as to development and location. Of the specimens taken, twenty-five per cent. or more have the notch at the perifery; in many of these a line of lighter color is left to mark the former positions of the notch, this line does not precede the notch on any other part of the shell.

These notched forms were only found where the water had a strong current; and it was not confined entirely to *Angitrema armigera*, for specimens of *Pleurocera* and *Vivipara subpurpurea* were taken in the same situation with the same peculiar notch.

Pyrgulopsis wabashensis was found on water plants in quiet water, on moss-covered rocks and timbers where there was some current at the water's edge, and at the old dam near New Harmony they were found in mid-stream, on rocks covered with a little moss and sediment.

DESCRIPTIONS OF NEW HAWAIIAN MARINE SHELLS.

BY H. A. PILSBRY AND E. G. VANATTA.

BITTIUM HILOENSE n. sp. Fig. 1.

The shell has the usual oblong-turrite shape, and is uniform yellowish gray-white except the swollen, slightly exserted first whorl,

which is opaque white and smooth. Subsequent whorls are flattened but separated by a deep suture, the earlier ones having two spiral beaded cords. At the end of the first $3\frac{1}{2}$ to 4 whorls a third spiral cord appears. The last whorl is rounded periferally, and has about 10 spiral cords, separated by spaces of about their own width; the upper 5 or 6 are nodose at the intersections of low, narrow, vertical folds, which do not extend below the perifery. The last whorl has a low, rounded, rather massive varix behind the outer lip. Aperture oval, produced in a short, deep channel at the base.

Length 3.34, diam. 1.39 mm.; whorls $6\frac{1}{2}$.

Hilo, Hawaii. Types no. 95906 A. N. S. P., collected by Mr. D. Thaanum.

This tiny *Bittium* is somewhat related to *B. leucocephalum* Wat-

Fig. 1.

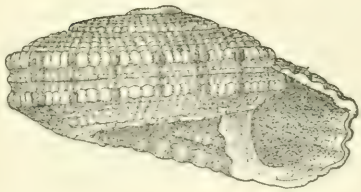


Fig. 2.

Fig. 3.

son, described from the reef at Honolulu, from which it differs in many details of shape and sculpture. Watson's type is evidently an immature shell, smaller than *B. hiloense*, but it has 8 whorls, while *hiloense* has but $6\frac{1}{2}$.

Torinia discoidea sterkii n. subsp. Fig. 2.

The shell is depressed, biconvex with flat perifery, widely umbilicate, the width of umbilicus contained 2.6 times in that of the shell.

First whorl is smooth, convex and bicolored, a spiral deep reddish-brown band half the width of the whorl revolving below the suture; on the second whorl this band spreads, becomes diluted, and finally disappears. Last whorl grayish, with white and brown spots along the periferal beaded cords. The last whorl has 5 beaded spiral cords above, the first and fifth larger; a beaded spiral lies between the two cords at the periferal angles. The base has 7 beaded spirals, the outer one and three inner larger than the others. Suture channeled. Alt. 2.3, diam. 4.6 mm.

Waikiki Beach, Honolulu, H. I. (F. Stearns). Types in the collection of the Academy of Natural Sciences of Philadelphia, No. 93833.

Differs from typical *T. discoidea* Pease in having one more spiral row of beads on the upper surface of the whorls and in having a small spiral row of beads between the two peripheral larger rows. It is also darker in color. The type specimens were picked from shell-sand by Dr. V. Sterki, in whose honor it is named. The same form was taken at the Marquesas Islands by C. D. Voy.

Turbonilla (Chemnitzia) thaanumi n. sp. Fig. 8.

The shell is very slender, turrite, slowly tapering, a little more rapidly so near the summit; somewhat translucent white. One nuclear whorl is planorboid, its axis not quite at a right angle with that of the shell, but a little oblique. Post-nuclear whorls are sculptured with rounded ribs, slightly oblique and gently sigmoid, equal to the intervals, and extending from suture to suture. On the last whorl there are 22 axial ribs; and the intervals parting them stop abruptly a short distance below the periphery, leaving the rest of the base smooth. There is no spiral sculpture. The sutures are deeply impressed; whorls evenly convex. The aperture is about one-fifth the total length, ovate. Columella nearly straight, somewhat concave below, gently convex above.

Length 3.1, diam. 0.82 mm.; post-nuclear whorls $8\frac{1}{2}$.

Hilo, Hawaii. Type no. 95907 A. N. S. P., collected by Mr. D. Thaanum.

This species differs from the Hawaiian *T. decussata* Pease by the absence of spiral sculpture.

NOTES.

Those interested in that most fascinating group, the Cephalopods, are quite likely to overlook a recent interesting contribution to our knowledge of the natural history of two of the larger species of cuttlefish and squid. The reference is to a chapter called (somewhat misleadingly since largely occupied with an account of the Californian octopus *Polypus punctatus*) "Ten Armed Game," occupying pp. 49–64 in Charles F. Holder's book "Big Game At Sea" (The Outing Publishing Co., 1908).

The book is an account of sporting experiences written for sportsmen and by no means pretends to be scientific, but bears internal evidence that the author is quite aware not only of the difference between imagination and testimony to fact, but of the distinction between first and second-hand testimony. In short, one judges that he has actually seen and done just about what he says he has—though he does not purport to state with the accuracy of a trained naturalist—and if so he has had experiences with giant forms of cephalopods most rare to men sufficiently educated to put them before the public.

There are three excellent full-page photographs, two of "giant octopi" from California (one "fifteen feet across"—*i. e.*, tip to tip of spread tentacles—the other, size not given, said in text to grow to twenty-five or thirty feet), and one of a "large squid caught at Avalon, Santa Catalina Ids.," by the author. The latter picture is extraordinary if not absolutely unique. It does not look "faked," unless perhaps about the eye, and the animal appears fresh if not actually alive, while the detail is clear. Unfortunately no measurements are given, nor is there any object in the picture to serve as a scale, while the text is annoyingly ambiguous. The author states that the length of the largest squid actually handled and measured by him was fifty feet (of which the long pair of tentacles made thirty), but rather implies that this was a Newfoundland specimen, presumably of *Architeuthis princeps* which Verrill has so elucidated.

Squids ranging from seven to eight feet in length are stated to be common on the California coast, where they may be watched in schools from boats—one would think with some slight misgivings if the boat were very small. Probably the figure is of one of these, though it somehow gives the impression of being larger—at all events it is self-evidently not an *Architeuthis*.

Those interested must read the chapter for themselves and regret its shortness and shortcomings, with the hope that the author may give students the benefit of a more full and exact account of the results of his unusual opportunities in this direction.

Anyone who has ever studied living squids cannot but delight in his simile of the sheet-lightning of a setting thunder-storm for the color-play of the chromatophores. At all events it bears the hall-mark of genuine observation.—F. N. Balch.

Lotorium felipponei *n. sp.* by H. von Ihering, Buenos Aires, 1908. A new species of the "*Triton*" *pileare* group is described and figured in this paper, issued as a separate publication. It was found at Maldanado, Uruguay, by Dr. Florentino Felippone, of Montevideo.

Errata.—In the June number, the following corrections should be made. Page 15, line 19, for "[now Bergh]" read [*non* Bergh].

P. 16, line 9, for "now" read "*non* Coryphella bostoniensis (Couth.)."

Mrs. George Andrews died at her home, Circle Park, Knoxville, Tenn., on Saturday, September 5th. Many conchologists, especially those of us whose activity in the science dates back twenty years or more, were friends or correspondents of Mrs. Andrews, and will hear of her death with sorrow. A notice of Mrs. Andrews's life will follow.

Mr. Jas. H. Ferriss is exploring the mountains of Arizona for land shells, ferns, etc., intending to return about the first of November.

Dr. John B. Trask, a pioneer of science on the West Coast, is the subject of an interesting article by Dr. R. E. C. Stearns (*Science*, Aug. 21). Trask went to California in 1850 and was one of the little coterie who founded the California Academy of Science. He discovered many mollusks, among other scientific labors, *Epiphragmophora traski*, and several other species bear his name.

The Nautilus.

Vol. XXII. NOVEMBER, 1908. No. 7.

A GIGANTIC SOLEMYA AND A NEW VESICOMYA.

BY WILLIAM HEALEY DALL.

In the course of the Albatross dredgings in the Philippines during the period in which Dr. Paul Bartsch of the U. S. National Museum was attached to the scientific staff of that vessel, a dredging was made between the islands of Ticao and Masbate in 600 fathoms. Among the objects obtained from this haul (station 5215) was the fresh shell of a *Solemya*, which, compared with the previously known species, may be regarded as enormous. Nothing remained of the soft parts which had evidently been but recently lost.

Solemya (*Acharax*) *bartschii* n. sp.

Shell subcylindrical, gaping at the ends and along the base, covered with a strong polished black periostracum which extends over the margins, being continuous over the dorsal portion between the valves and produced beyond the edges of the shelly portion, basally about 40, in front about 35, and behind about 15 millimeters. In life this produced periostracum, undoubtedly covers and protects the portions of the surface of the animal not sheltered by the calcified valves; the margin at the anterior end is not split into strips corresponding to the radii of the shell as in the large American species of the group, but preserves its continuity and is contracted marginally so that in life it must closely cover the whole anterior end of the animal, in a dome-like manner. Internally the ligament is wholly

opisthodetic but in front of the beaks the periostracum is produced inside the dorsal margin as well as externally. This interior extension covers a narrow strip of the thickened dorsal margin of each of the valves, leaving about two-thirds of these pseudo-nymphs bare and strongly radially grooved and striate, the radii diverging from the dorsal margin of the valves slightly in front of the beaks, and doubtless serving to make more efficient the local attachment of the periostracum, which is here thickened and expanded. The ligament is wide and strong, external, but visible in the gap between the valves behind the beaks and supported by heavily calcified nymphs. Behind the nymphs the dorsal margin of the shell on each side exhibits a long and conspicuous indentation. The valves are heavily calcified, internally radiately striate, the ventral margin straight, the dorsal margin nearly parallel to it except as modified by the nymphs, the two valves touching only near the beaks, which are low but swollen, the rather narrow dorsal interval between the valves being covered by a continuous sheet of the thick periostracum. The posterior muscular impression is of moderate size and obliquely ovate, the anterior smaller, narrow and rhomboid in shape; the pallial line is obscure and continuous, situated close to the margin of the valves; externally the surface is smooth except for lines of growth and a number of shallow, wide, radiating channels which proceed from the beaks toward the margin of the valves, where they produce a certain amount of undulation. Anteriorly there are eight, posteriorly six of these channels, with a median space which has no rays, and, on the basal margin of the valves, is about 50 mm. wide. The beaks are about 75.0 mm., in front of the posterior end. The shelly part of the valves is 191 mm. long (the total length including periostracum is about 240 mm.), the height 62 mm. (with periostracum about 100 mm.), and the estimated diameter of the valves in life about 60 mm.

The perfect condition of this specimen enables us to understand the origin and use of the striated and thickened area of the anterior dorsal margin of the values, already noted by me in *S.* (*A.*) *agassizii* from the Gulf of Panama. To preserve it in its present satisfactory state it will be kept in alcohol.

With this remarkable specimen was obtained an interesting shell of *Vesicomya*, also without the soft parts, which may be described as follows:

Vesicomya ticaonica n. sp.

Shell ovate, tumid, inequilateral, with the beaks within the anterior fourth of the length, low, prosocoelous, tumid, overhanging a large cordate lunule, of which the left valve carries a somewhat large portion; surface rude, sculptured irregularly and strongly by incremental lines; periostracum brownish, covering a livid whitish shell; ligament rather long, set in a deep, narrow groove; hinge as usual in the genus; interior chalky-white except the polished muscular impressions; pallial line broad, slightly irregular, with a feeble insinuation below the posterior adductor scars; shell thin, margins entire. Length 63, height 45, diameter 30, the beaks behind the anterior end 15 mm. The ligament is about 22, and the lunule 14 mm. in length. The shell is more tumid and more attenuated in front of the beaks than any other described species and exceeds most of them in size.

THE MOLLUSCA OF MCLENNAN COUNTY, TEXAS.

BY JOHN K. STRECKER, JR.

In 1883, Mr. Henry Hemphill sent a few species of shells from Waco, to Dr. W. G. Binney. These specimens are now in the Binney collection in the United States National Museum (see Manual of American Land Shells, Bull. U. S. Natl. Mus., No. 28, 1885, pp. 477, 485, etc.). I have been unable to find any examples of two of the species recorded, i. e., *Praticolella griseola* Pfr. and *Vitrea sculptilis* Bland.[1]

In Singley's list of Texas Mollusca (Report Geol. Survey of Texas, 1893, pp. 299–343) several species of McLennan county shells are mentioned. I include *Bulimulus d. schiedianus* Pfr. in my list on this authority, although I have not collected it personally.

Examples of all of the other species mentioned in this paper have been collected by me during the past two years. Future investigations will doubtless bring others to light but as local lists of Texas

---

[1] The records of these two species from Waco are in all probability erroneous; the specimens identified as *griseola* must be a thin form of *P. berlandieriana*, and the supposed *V. sculptilis* is *V. indentata umbilicata*.—Ed.

Mollusca are exceedingly few and far between, I feel that my list is sufficiently complete for publication at this time.

During the present year, the heavy rises and great floods have played havoc with the various species of univalves inhabiting our smaller streams. In 1907 a light-colored variety of *Planorbis tumidus* Pfr. was found in Waco Creek in countless thousands but in July of the present year repeated visits to the most favorable places on this stream failed to result in the finding of a single living specimen.

In April, 1908, I collected a large number of examples of *Lymnæa bulimoides techella* Hald and *Physa mexicana conoidea* C. & F. in a small stream flowing through Lindsey's Hollow. As my time was limited, I left the collecting of a still larger series until another time. A month later, during the flood, all of the mollusks in the stream were washed into the Brazos River.

On the other hand, the drying-up of most of the smaller water courses in the latter part of the summer is also responsible for the destruction of many species. In places along Hog Creek, during the dry season, I have found thousands of fresh dead shells of *Physa forsheyi* Lea, *Planorbis bicarinatus* Say and *Planorbis tumidus* Pfr. lying together in one heap. In the same place, on a bed of sand and gravel, I have found half-grown living examples of *Anodonta imbecilis* Say. The bed of this stream, in some places, is composed of pebbles and small boulders to a depth of 18 or 20 inches, and when the naiads are left high and dry it is impossible for them to burrow down to the line of moisture.

At Day's Lake I have found living specimens of a variety of *Unio tetralasmus* Say that must have been out of the water for several months. They were half buried in a bank of dry earth about five feet above the water line. This Unio is much more tenacious of life than our species of *Quadrula* and *Lampsilis*, as a very few hours in the sun usually suffices to kill them.

Thanks are due to Mr. Bryant Walker of Detroit who kindly identified most of the species on the list. Also to Mr. W. B. Marshall, U. S. Natl. Mus. Washington, D. C., and Dr. W. S. Strode, Lewistown, Ill., to whom the others were referred.

Helicina orbiculata tropica Jan.
Praticolella berlandieriana Moricand.
Praticolella griseola Pfr.
Polygyra dorfeuilliana Lea.
Polygyra dorfeuilliana sampsoni Weth.
Polygyra mooreana W. G. B.
Polygyra texasiana Moricand.
Polygyra roemeri Pfr.
Polygyra monodon fraterna Say.
Bulimulus dealbatus liquabilus Rve.
Bilimulus dealbatus mooreanus Pfr.
Bulimulus dealbatus schiedianus Pfr.
Strobilops labyrinthica texasiana P. & F.
Pupoides marginatus Say.
Bifidaria armifera Say.
Bifidaria contracta Say.
Bifidaria tappaniana C. B. Ad.
Bifidaria pentodon Say.
Bifidaria procera cristata P.& F.
Bifidaria pellucida hordeacella Pils.
Vitrea sculptilis Bland.
Vitrea indentata Say.
Vitrea indentata umbilicata Singley.
Vitrea dalliana roemeri P. & F.
Euconulus fulvus Mull.
Euconulus chersinus trochulus Reinh.
Zonitoides arboreus Say.
Zonitoides minusculus Binn.
Zonitoides singleyanus Pils.
Limax flavus Linn.
Philomycus carolinensis Bosc.
Pyramidula alternata Say.
Helicodiscus eigenmanni P. & F.
Punctum pygmæum Drap.
Succinea avara Say.
Carychium exile H. C. Lea.
Planorbis bicarinatus Say.
Planorbis liebmanni Pfr.
Planorbis parvus Say.
Planorbis trivolvis Say.
Planorbis tumidus Pfr.
Physa mexicana Ph.
Physa mexicana conoidea C. & F.
Physa forsheyi Lea.
Physa rhomboidea Crandall.
Physa osculans Hald.
Amnicola peracuta P. & W.
Lymnæa desidiosa Say. (Variety?)
Lymnæa bulimoides techella Hald.
Calyculina transversa Say.
Tritogonia tuberculata Barnes.
Quadrula forsheyi Lea.
Quadrula aurea Lea.
Quadrula pustulosa Lea. (Smooth variety.)
Anodonta imbecilis Say.
Lampsilis gracilis Barnes.
Lampsilis purpuratus Lamarck. (Variety.)
Lampsilis berlandieri Lea.
Lampsilis berlandieri Lea. (Variety.)
Lampsilis anodontoides Say.
Lampsilis parvus Barnes.
Lampsilis texasensis Lea.
Lampsilis ventricosus satur Lea.
Lampsilis lævissimus Lea.
Plagiola macrodon Lea.
Unio tetralasmus Say.
Unio tetralasmus manubius Say.
Unio tetralasmus camptodon Say.

NOTES.

Polygyra mooreana W. G. B.

Near the gravel pit north of Waco, I found two adult and three juvenile specimens of a variety of this species with a hirsute epidermis. Three of these were found under a rock lying at the foot of gravel bank. A fourth was attached to the under side of a plank lying across a spring about three or four yards away. The fifth example was crawling around in the damp grass about a yard from the spring. In the living specimen, the hairs are very conspicuous and stand straight out from the shell. Living examples of the ordinary type were afterwards found on all the surrounding elevations, but the hirsute variety seems to be confined to the vicinity of the spring.

Limax flavus L.

This species is now common, but must have been introduced within the last three years. Prior to that time a great many slugs were collected by students of the Biological Department of Baylor University. These are now in the University Museum, and all prove to be specimens of the native species *Philomycus carolinensis* Bosc. Most of my examples of *L. flavus* were captured during the spring of the present year.

Planorbis trivolvis Say.

This pond snail is rare. All of the examples I have seen came from Day's Lake about five miles notheast of Waco.

Planorbis tumidus Pfr.

This species is our most abundant *Planorbis*. A large, light-colored variety was formerly abundant in Waco Creek. A small, depressed form is found in Hog Creek in considerable numbers.

Physa sp.

Imperfect specimens of an indeterminate *Physa* were picked out of drift material on the Middle Bosque River. The spire was broken in all these specimens and while Bryant Walker stated that he was certain that they were different from anything that I had sent him before, he was unwilling to attempt to name them until he could examine more perfect material.

Lymnæa sp.

We have at least one other species of *Lymnæa* but of this form only juvenile examples, too young for determination, have been collected.

Quadrula pustulosa Lea.

A smooth variety of this species is found associated with *Quadrula aurea* Lea. In this variety there are only a few small pustules near the umbones and in some specimens even these are lacking. Specimens identified by F. C. Baker and Bryant Walker. Several pustulous shells of this species that were supposed to have been collected in this county, prove to have come from southern Illinois.

Lampsilis purpuratus Lamarck (Variety).

A number of shells from near Mussel Island in the North Bosque River were first identified as typical *L. purpuratus* Lk. Later examples of the same type were identified as typical *L. berlandieri* by Dr. W. S. Strode and Mr. Bryant Walker. The last-mentioned gentleman found three different forms in a second sending from the same locality. These he designates as

Lampsilis berlandieri Lea.

Lampsilis berlandieri Lea var.

Lampsilis purpuratus Lamarck var.

The variety of *L. berlandieri* Lk., is very variable in the color of the nacre which ranges from white, through pink and salmon, to dark purple. These shells were found in the ripples above Mussel Island while the examples of the typical form and the specimens of *L. purpuratus* var., were found in a large bed some distance below.

DESCRIPTIONS OF NEW SPECIES OF ACHATINELLIDAE, FROM THE HAWAIIAN ISLANDS.

BY D. D. BALDWIN.

Partulina winniei n. sp.

Shell sinistral, subperforate, rather thin, elongately conical, apex subacute; surface shining, striated with fine growth lines, and under a lens showing very close and delicate decussating spiral striæ; nuclear whorls faintly decussated. Color white, striped and mottled irregularly with longitudinal dark brown streaks; apex white. Whorls 6, slightly convex, margined above. Aperture oblique, oval, purplish-white within. Peristome acute, thickened within, columellar margin reflexed. Columella terminating in a slight, flexuous, white fold.

Length 16; diam. 8 mm.

Habitat, Kahakuloa, West Maui.

This shell is the Maui counterpart of *Part. theodorei*, Bald., a much larger shell found on the Island of Molokai.

Named in honor of Miss Winnie of Walluku, Maui.

Partulina mutabilis, n. sp.

Shell dextral or sinistral, minutely perforated, somewhat solid, acuminately conical, apex subacute; surface shining, marked with delicate incremental striæ, under a lens exhibiting very close decussating, spiral striæ; apical whorls smooth. Color varying from pure white to dark fulvous, often variously striped with brown lines and bands, some on the base and others spiral. Whorls 6, convex, margined above, suture well impressed. Aperture oblique, oval, white within, columella margin reflexed. Peristome acute, thickened within. Columella terminating in a well-developed, flexuous white fold.

Length 16; diam. 10 mm.

Habitat, Waichu Valley, West Maui.

This shell seems to be the Maui counterpart of *Partulina variabilis*, Nc. a larger shell which is found on the neighboring island of Lanai.

Laminella duoplicata, n. sp.

Shell sinistral, sometimes slightly perforated, thin, elongately conical, apex obtuse; surface shining, marked with fine growth striæ, nuclear whorls smooth. Color light yellow, marked with somewhat regular black lineations, apex black, whorls six, convex; suture well impressed. Aperture a little oblique, oval, white within. Peristome simple, very thin. Columella white, biplicate, the terminal plication a thin, oblique lamellar plait, the inner one less prominent.

Length 12; diam. 6 mm.

Habitat, Waichu Valley, West Maui.

This and the following species are important additions to the Laminellæ of Maui. The only previously described Maui species of this section are *Lam. picta*, Migh., *Lam. alexandri*, Nc. and *Lam. erecta* Pse.

Laminella aspera, n. sp.

Shell sinistral, minutely perforated, thin, conical, apex obtuse,

surface exhibiting very coarse and irregular growth striæ. Color yellow, plain or marked with irregular black lineations, apex black. Whorls 6, convex; suture well impressed. Aperture a little oblique, sub-rotund, yellowish within. Peristome simple, very thin. Columella white, biplicate, not prominent.

Length 10; diam. 7 mm.

Habitat, Wailuku valley, West Maui.

This species is remarkable for the very coarse and irregular growth striæ exhibited on its surface.

Cotypes of these species deposited in the Acad. Nat. Sci. Phila. will be figured in the next volume of the Manual of Conchology.

THE MIOCENE SPECIES OF LYMNAEA.

BY T. D. A. COCKERELL.

In Bull. Am. Mus. Nat. Hist., Dec., 1906, I described two small species of *Lymnæa* from the miocene beds of Florissant. In 1907, at station 1, I found a much larger species, unfortunately not in the best state of preservation. I hoped to find more material in 1908, but as none was obtained, a description from the original type is now offered.

Lymnæa florissantica, n. sp.

Length 21 mm.; diameter about 10½; spire short, scarcely over 5 mm. long, the whorls moderately convex; body-whorl not very convex, with coarse, shallow, vertical grooves. In Baker's key in his Mollusca of the Chicago Area, it runs nearest to *L. palustris*, but it is not at all like that species. It is in reality a miocene representative of *L. emarginata*. In Mr. O. O. Nylander's series of figures of *L. emarginata* (published by the author in a pamphlet, 1901), it closely resembles Pl. 1, f. 7, except that it is distinctly more slender, and the base is narrower, about as in fig. 8, though the rest of the shell is not at all like fig. 8.

The following table separates the miocene species of *Lymnæa*.

Spire short and rather obtuse,
body-whorl large . . . . . 1.

Spire rather or quite long, acute, the apex slender	2.
1. Length over 20 mm., apparently related to *L. emarginata* . . .	*L. florissantica*, n. sp.
Length 6 mm. or less, perhaps related to *L. catascopium* . .	*L. scudderi* Ckll.
2. Small species, about 8 mm. long, closely related to *L. truncatula* .	*L. sieverti* Ckll.
Larger species, over 18 mm. long .	3.
3. Smaller, aperture about half length of shell; apparently related to *L. palustris*	*L. shumardi* Meek & Hayden.
Larger, aperture over half length of shell; apparently related to *L. stagnalis*	*L. meekii* Evans & Shumard.

L. shumardi and *meekii* are from the White R. beds; the others are from Florissant. *Lymnæa* was extraordinarily well developed in the Oligocene of Britain. As my memory serves me it seems that the minor modern groups were already well marked, and it may be considered probable that the types of *L. stagnalis*, *palustris* and *truncatula*, at least, were developed first in the old world, and reached America during the tertiary period. This is also suggested by the fact that the older (Laramie and Eocene) American species of *Lymnæa* do not suggest the modern circumpolar groups.

FALSE SHELLS.

BY C. W. JOHNSON.

Among the many specimens received from young collectors for determination there are occasionally non-molluscan forms so closely resembling shells, that they have been mistaken for mollusks; in fact, they have even deceived some of the more experienced conchologists.

In the more primitive crustacea, including the *Phyllopoda*, especially in the family *Estheriidæ* and the *Cladocera* and *Ostracoda*, the carapace is largely developed and forms a broad oval shell covering

entirely or most of the body, and divided into right and left halves, and hinged together on the dorsal line, thus giving the appearance of a bivalve mollusk.

Some of the insects also afford interesting examples. The larvæ of several species of caddice-flies, including the genus *Helicopsyche*, make spiral cases in which they live clinging to the rocks and stones in rapidly flowing streams. The little spiral cases composed of grains of sand, fastened together with silken threads resemble so closely the form of a *Trochus* or *Valvata* that Swainson (Treatise on Malacology, p. 353, f. 113, 1840), described one as the *Thelidomus braziliensis*, placing it in the family *Trochidae*, sub-family *Rotellinæ*. Dr. Isaac Lea (Trans. Amer. Phil. Soc., iv, 104, pl. xv, f. 33, 1830), described a similar larva case as *Valvata arenifera*.

In the Entomologist's Monthly Magazine, xxi, p. 1, 1884, Robert McLachlan describes and figures an "extraordinary heliciform lepidopterous larva case from East Africa." These closely resemble a high-spired *Helix* or *Vivipara*, both sinistral and dextral. The larva case of an allied species of Southern Europe, *Psyche* (*Cochloplanes*) *helix* is also figured, having the form of a small irregular helicoid shell. Larvæ of the genus *Microdon* of the dipterous family *Syrphidæ* have twice been described as land mollusks.

Numerous worm tubes of the family *Serpulidæ* formed by species of *Ditrupa* and *Pomatoceras* have frequently been described as *Dentalium* (see Pilsbry and Sharp, Manual Conch., xvii, 240).

NOTES.

Caught in a living trap.—In the window of a Salem, Mass., store may be seen a unique sight, that of a kingfisher held tightly in the grip of a mussel. The story is this:

This forenoon patrolman Michael J. Little while crossing Beverly bridge, saw the bird fluttering on the flats, and he asked a fisherman to investigate. The latter went to the spot and there found the bird drowned.

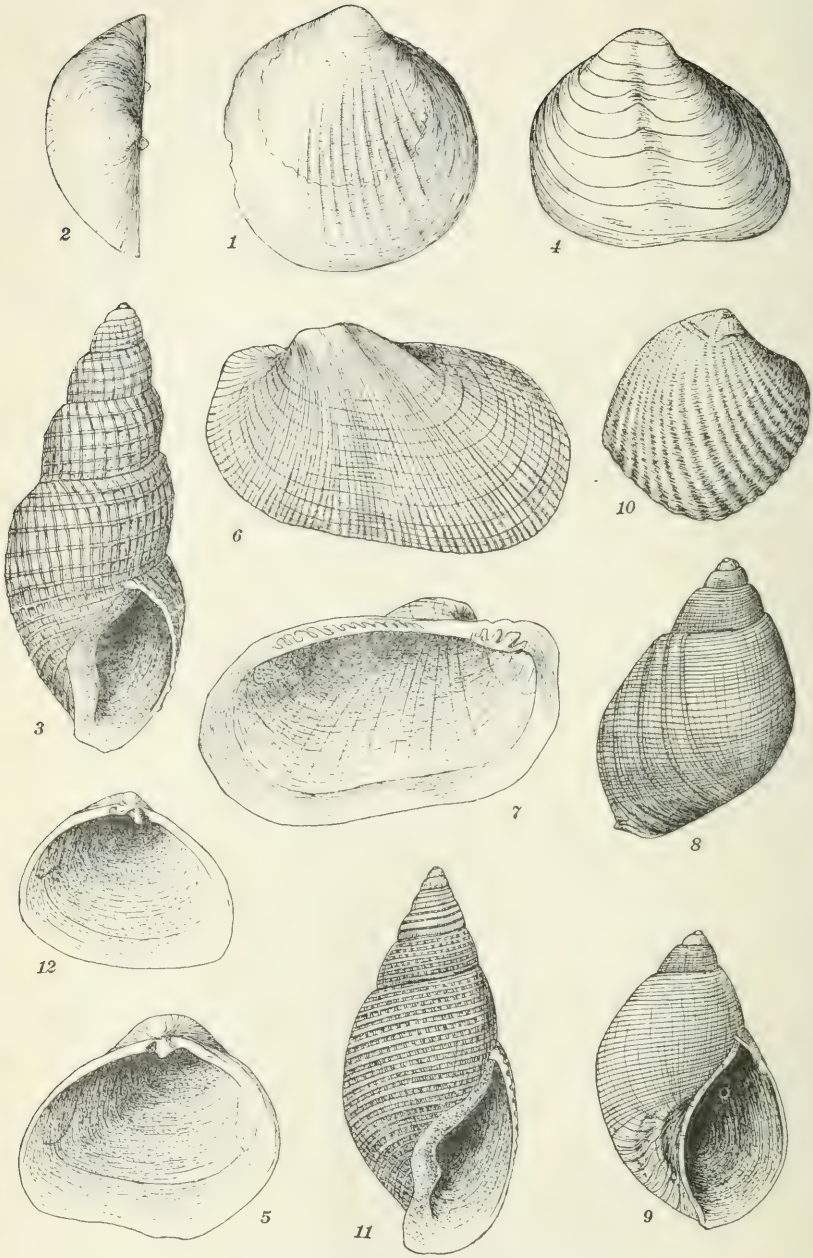
It had swooped down and poked its bill into the open shell of a mussel, which suddenly closed on the bill of the bird. There the the two remained, until the incoming tide drowned the bird. Hundreds have viewed the singular sight today.—(*Boston Globe*).

MARTYN'S UNIVERSAL CONCHOLOGY.—In the course of his very instructive paper on "Thomas Martyn and the Universal Conchologist," in the Proc. U. S. N. M., xxix, 1905, Dr. William H. Dall writes as follows (p. 425), "I am not aware of any other copies of the "Universal Conchologist" in America than the one I have described [a copy in the U. S. National Museum comprising the first eighty plates] and a similar copy in the Academy of Natural Sciences, Philadelphia. Later in his "Supplementary Notes, etc.," in the same Proceedings, vol. xxxiii, 1907, p. 185, Dr. Dall describes a third copy in the possession of Mr. John B. Henderson, Jr., of Washington, likewise consisting of eighty plates, "elegantly bound."

It may be of interest to readers of THE NAUTILUS, especially those residing on the Pacific Coast, to know that there is a fourth copy of this rare work in the library of the Leland Stanford Junior University. This copy comprises all four volumes of the work, including beautiful impressions of the entire 161 plates, and is complete save for the explanatory table for the plates of the third volume. The series was the gift of Mr. Timothy Hopkins, and in this case, also, each volume is "elegantly bound." A copy of the prospectus of the work, similar to the one described by Dr. Dall is laid into the first volume. Beyond this the copy agrees very well with those already described by Dr. Dall. S. S. BERRY.

HELIX ARBUSTORUM var. ROSEOLABIATA.—The var. *roseolabiata*, described as new by Mr. Schlesh in NAUTILUS, October, p. 55, is var. *roseolabiata* Roberts, described from the British Islands many years ago. T. D. A. COCKERELL.

MR. J. H. FERRISS, who has been getting snails, ferns and health in the Chiricahua range, Arizona, expects to return about November 15th. He has not yet turned up the *multicornis*—a shell reported to be as big as a tin-cup, with horns—but he has found many other good things.



ALDRICH: NEW EOCENE MOLLUSCA.

THE NAUTILUS.

VOL. XXII. DECEMBER, 1908. No. 8.

A NEW HAWAIIAN KALIELLA.

BY H. A. PILSBRY AND E. G. VANATTA.

KALIELLA GAETANOI n. sp. Fig. 1.

The shell is perforate, thin, cream-white (the specimens being fossil). Spire straightly conic, the apex rather obtuse. First $1\frac{1}{2}$ whorls white, smooth and convex; following whorls are flattened, finely, rather weakly and irregularly striate radially, the base being irregularly radially striate, with fine microscopic engraved spiral lines. Whorls $5\frac{1}{2}$, very slowly widening, the last acutely carinate, this carina showing immediately above the suture as a narrow seam. The base is convex. The aperture is narrow, truncate at the ends, basal and parietal margins parallel. Columellar margin is short, subvertical, with the edge narrowly expanded.

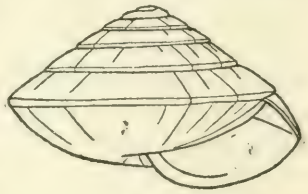


FIG. 1.

Alt. 2.87; diam. 4.84 mm.

Palihoukapapa, Hawaii, fossil. Type No. 95779 A. N. S. P., from No. 4730 of Mr. D. Thaanum's collection.

Kaliella subtilissima (Gld.) and *K. konaensis* Sykes are both less elevated species, otherwise related. Named for the discoverer of the Hawaiian Islands.

NEW EOCENE FOSSILS FROM ALABAMA AND MISSISSIPPI.

BY T. H. ALDRICH.

KELLIA INTERSTRIATA n. sp. Pl. v, figs. 1, 2.

Shell orbicular, slightly inequilateral, very much the shape of a tumid *Diplodonta*, surface smooth except in the medial part where it is distinctly striated. These striae are rather coarse, extending to the basal margin, but they stop at the umbo. Beaks rounded, fairly prominent, pointing inward, and terminate directly above one of the semi-laterals; no lunule. Dentition normal. Length, breadth and thickness about 5 mm.

LOCALITY. Enterprise, Miss. Top of Burrstone.

REMARKS: This shell has the general shape and outline of *K. suborbicularis*, Mont., also a similar dentition. It is peculiar in carrying the medial striations.

Kellia prima Aldr. is a Bornia according to Prof. W. H. Dall.

CANCELLARIA? SOTOENSIS n. sp. Pl. v. fig. 3.

Shell small, whorls about seven, the first two and a half embryonic and smooth, the cancellation beginning on the second half of the third whorl: the remaining whorls strongly cancellated, the body whorl contains 12 spiral lines, while the longitudinals are nearly three times as many; slightly nodular at the intersection points, suture very deep. Whorls strongly rounded. Base somewhat rounded. Aperture oblong, outer lip denticulated within, inner lip rather twisted, and carrying a small fold near the base. Umbilicus not entirely closed.

Length 8 mm.; width body whorl 3 mm.

LOCALITY. De Soto, Miss. Claibornian.

REMARKS: This little shell is more slender in shape than the drawing shows, and the suture is much more deeply impressed. It has somewhat the aspect of a *Scala*.

CORBULA CLARKEANA n. sp. Pl. v, figs. 4, 5.

Shell small, medium thickness, valves moderately inflated. Beaks not very prominent, polished, a groove running from beaks to base in the largest specimens, nearly in the middle of the shell. Valves marked with a few impressed lines of growth wide apart; the outer

surface having a polished look; smooth internally, cardinal tooth large, projecting.

Lon. 3½ mm.; alt. 3 mm.

LOCALITY. Wood's Bluff, Ala.

REMARKS: This little shell differs from any Corbula known to the writer by its polished appearance, and its few impressed lines, rare. One small valve does not have any depression running from beak to base, but is quite regularly rounded.

ARCA (BARBATIA) LIGNITIFERA n. sp. Pl. v, figs. 6, 7.

Shell small, thin, extremities rounded, moderately convex, beaks small and flattened; surface marked by many radial riblets crossed by irregularly spaced lines of growth; a depressed area running from beaks to base nearly central; valves smooth internally, but showing faint lines corresponding to some of the riblets. Hinge line long, slightly curved; the hinge carries four close-set teeth anteriorly, next a short vacant space, and then ten to thirteen small teeth, larger and more nearly parallel to the hinge line as they approach the posterior.

Lon. 5 mm.; alt. 3 mm.

LOCALITY. Six miles east of Thomasville, Ala., Wood's Bluff horizon.

SIGARETUS (EUNATICINA) ERECTOIDES n. sp. Pl. v, figs. 8, 9.

Shell small, thin, whorls five rapidly enlarging, apex somewhat twisted; the first two whorls smooth, the others covered with very numerous fine raised lines which become coarser on the body whorl. Aperture oblong, nearly twice as long as broad; outer lip slightly thickened; umbilicus channeled, and slightly open.

Lon. 6½ mm.; diam. 4 mm.

LOCALITY. De Soto, Miss., Claibornian.

REMARKS: This little shell has very much the form of a small *Succinea*, and resembles in miniature the living forms of the subgenus.

VERTICORDIA (HALIRIS) GRANULOIDES n. sp. Pl. v, fig. 10.

Shell small, rather rotund, surface with numerous rounded ribs, about nineteen in the type; they are granulated under a glass, and rather scabrous between the ribs, especially on the anterior. Posterior slope slightly angulated; basal margin crenulated. The ribs

also show through the body of the shell. Beak small and smooth, the cardinal tooth strongly projecting.

Lon. 2½ mm.; alt. 2½ mm.

LOCALITY. Wood's Bluff, Ala.

REMARKS: This species is mentioned by Prof. Dall as *Verticordia* sp. indet. The description is made from a good specimen found by the writer. The shell is rather small for even this genus.

ACTEON POMILIUS *Con.*, var. MULTANNULATUS. n. var. Pl. v. fig. 11.

The specimen here figured differs from the typical form by having much more numerous raised lines with shallower interspaces. The spire is higher and the shell more slender. The *Acteon* found by me at Wood's Bluff is different from the form figured by Prof. G. D. Harris, not having any smooth space on the body-whorl. These so-called species appear to belong in one basket.

Height 9 mm.; diam. 6 mm.

LOCALITY. Six miles east of Thomasville, Ala., Wood's Bluff beds.

LEPTON VAUGHANI n. sp. Pl. V, fig. 12.

Shell small, surface smooth and shining; lines of growth very fine, shell rather triangular in shape, longer than high; slightly inequilateral. Muscular scars showing, the posterior one rather long and narrow.

Long. 3 mm.; alt. 2 mm.

LOCALITY. Wood's Bluff, Ala.

REMARKS: This species seems to be an undoubted member of this genus, as it has the proper dentition; some specimens are equilateral. Named in honor of T. Wayland Vaughn of the U. S. Geological Survey. This seems to be the first *Lepton* found in the Eocene.

NEW LAND SHELLS FROM ARIZONA AND NEW MEXICO.

BY GEO. H. CLAPP.

Bifidaria (Chænaxis) tuba subsp. intuscostata.

Differs from the type, externally, by its larger size, length 4, diam. 2 mm. and the greater number of whorls, 6½. The smallest normal

shell measured is $3\frac{1}{4} \times 1\frac{4}{5}$ mm. with about $5\frac{1}{2}$ whorls, and the largest $4\frac{1}{5} \times 2$ mm. with $6\frac{3}{4}$ whorls. Internally there is a strong lamella on the columella, which can only be seen by breaking the shell, *about 2 whorls long* in fully adult shells. Examination of a large number of shells of all ages shows that this lamella is a mark of maturity, as it does not appear until after the angular, parietal and outer columellar lamellæ have begun to form.

The arrangement and number of the other lamellæ and plicæ are the same as in the type, with the usual variation as to extra denticles, ordinarily seen in *Bifidaria*. The body whorl is decidedly angular at the umbilicus, and flattened below the periphery.

Foothills of the Plumosa Range, about eight miles east of Quartzsite, Yuma county, Arizona, in drift. Collected by Mr. Geo. S. Hutson.

Type No. 5769 of my collection. Cotypes in Academy Natural Sciences, Philadelphia, and U. S. National Museum.

In the peck or more of drift from which these shells were picked, there were only two other species, *Bifidaria hordeacella* Pils. and *Pupoides marginatus* (Say), with not even a fragment of anything else.

In the Eagle Tail Mountains, twelve miles north of Kofa, Yuma county, at an altitude of about 2,000 feet, Mr. Hutson found a form which is apparently intermediate between the type and *intuscostata*, in that the columellar lamella is weaker and does not extend in so far. This is probably the form referred to by Pilsbry in Proc. A. N. S., 1906, page 146, taken by the late Dr. Ashmun at Tempé, Maricopa county. The habitat given by Hutson is: "In moist places among piles of loose rock covered by decaying cactus. Associated with these were also *Bif. hordeacella* and *P. marginatus*.

The finding of this species in Cochise, Maricopa and Yuma counties, shows a distribution of *B. tuba* clear across the territory.

ASHMUNELLA KOCHII n. sp.

Shell very much depressed, almost flat above, convex below, carinated, the carina about in the plane of the upper surface; sutures well impressed, whorls $5\frac{1}{2}$; surface almost smooth, with faint and closely-set incremental lines; nuclear whorl and a half finely granulated; base convex, flattened around the umbilical region; umbilicus deep, about $1\frac{1}{4}$ mm. wide, showing a full turn of the penultimate

whorl, termination of the body-whorl sharply descending at the aperture to about the middle of the whorl. Aperture very oblique; lip obtusely angled and almost perpendicular below the middle of the whorl; strongly constricted behind the reflected lip; peristome well expanded above, narrower below, somewhat flexuous, united over the body by a thin callus; parietal lamellæ two, converging, but not united at the inner end into a V; the lower lamella stout, sinuous, the outer end bent sharply towards the umbilicus; the upper lamella low, narrow and straight, starting near the upper insertion of the lip and terminating back of the front end of the lower lamella; basal part of the peristome with two strong lamellæ transverse to the lip, the upper ends converging and united at the base on the lip, forming a U; a broader and less transverse lamella set more deeply within the aperture on the upper lip, a small internal lamella on the base of the body whorl about three or four mm. long, showing faintly through the shell.

Greater diameter 20½, lesser 18, alt. 6¾ mm. Black Mountain, at the southern end of the San Andreas Range, Donna Ana county, New Mexico, at an elevation of about 6,800 feet.

This interesting shell was first collected by Mr. Walter E. Koch over a year ago. He sent me one perfect and one broken shell. Lately he has sent me three additional specimens, also dead. He reports dead shells quite plentiful in the crevices of a limestone cliff, but was unable to find living ones. I take great pleasure in naming the shell after him.

Type no. 5765 of my collection.

A. kochii is undoubtedly closely related to *A. mearnsii*, but is very much larger, more strongly carinated, and differs markedly in the umbilical region.

Both of these species will be figured on plate VI, to appear next month.

NOTES ON THE GENUS STROBILOPS.

BY HENRY A. PILSBRY.

The small forest-snails known as *Strobilops* are spread throughout all parts of North America east of the Rockies where sylvan conditions prevail, from Canada to Florida, Mexico and Central America.

Southward the genus extends to Venezuela, and even to the Galapagos Islands, if I am right in referring the little snail described as *Endodonta helleri* Dall to this genus.

For many years similar snails have been known from the European Tertiaries, beginning with the Eocene and running up with numerous species through the Miocene, when the group apparently died out in that region, though many of its companion groups survived.[1]

Père Heude, the keen and brilliant Jesuit missionary-naturalist, described the first Asiatic *Strobilops*, in his memoirs on Chinese snails, under the name *Helix diodontina*. He did not recognize its kinship with other forms of *Strobilops*, nor has this been noticed by any other author until the present year, when the receipt of specimens of a *Strobilops* from Korea gave occasion for referring the Chinese *H. diodontina* to its proper genus. The Korean species, which I have decribed as *Strobilops hirasei*,[2] is conic, like most American species, but it is simply striate instead of being ribbed. Quite lately a third Asiatic species has been sent by Mr. Hirase, discovered in the main island of Japan. It will be described in the Japanese *Conchological Magazine*. The finding of three species, in China, Korea and Japan, indicates Eastern Asia as another evolution-center for species of *Strobilops*. Probably still more will turn up there as the country is further explored.

But this is not all. Several years ago Dr. O. von Moellendorff described several small snails from the Philippine Islands under the generic name *Plectopylis: P. quadrasi* with a variety *brunnescens* from Luzon, and *P. trochospira* from Bohol. In his able and exhaustive work on *Plectopylis*,[3] Mr. G. K. Gude has erected a subgenus *Enteroplax* for these species, rightly holding that they differ markedly from true *Plectopylis*. In reality, these Philippine snails are nothing more or less than *Strobilops*, having the form, sculpture, peristome and internal armature of this genus, the entering lamellæ or cords on the parietal wall being minutely nodose, as in American and East Asiatic *Strobilops*. These Philippine species will stand as *Strobilops quadrasi* (Mlldff.) and *Strobilops trochospira* (Mlldff.).

[1] The identification of *S. labyrinthica* as a European fossil, recorded in Woodward's Manual and copied in some American works, is erroneous. The foreign species is quite distinct.

[2] The Magazine of Conchology, II, p. 39, figs. Y. Hirase, Kyoto, 1908.

[3] The Armature of Helicoid Land Shells, Science Gossip, 1899, p. 149.

As to the place of origin of *Strobilops* we have no reliable data. The presence of typical forms of the genus in the Eocene shows that the group is a very old one, evolved in the Mesozoic. It is, moreover, strikingly distinct from all other genera, and wonderfully conservative in general morphology. Until information from Mesozoic strata comes to hand, we can only surmise with some probability that *Strobilops* arose somewhere in the northern hemisphere. It probably overran the entire Holarctic realm a long time ago, pushing southward into the Oriental region and the American tropics at a time remote enough to permit the evolution of strongly marked species in these areas.

ANOTHER LARGE MIOCENE SCALA.

BY W. H. DALL.

Mr. W. W. Atwood of the U. S. Geological Survey has been making a study of the Miocene strata of Alaska Peninsula and the Shumagin Islands during the past summer, and collected a number of interesting fossils. Among these is a specimen of a species of *Scala*, or *Epitonium*, belonging to the group of giant Scalidae which is so characteristic of the Miocene of Oregon and some other parts of the Pacific coast. The list comprised the following species already described and figured.

Opalia rugifera Dall,

Arctoscala condoni Dall,

Catenoscala oregonensis Dall;

together with the species about to be described. The type of *Arctoscala* is *A. greenlandica* Perry, a recent species. *Opalia rugifera* is a member of the group represented in the San Diego Pliocene by *O. varicostata* Stearns, and in the recent fauna by *O. borealis* Gould. *Catenoscala* is a new group in which the anterior third of the whorl is covered with a thick layer of enamel.

Epitonium (*Acrilla*) *atwoodi* n. sp.

Shell large, with rotund whorls rapidly increasing in size; surface covered with a low reticulate sculpture comprising low axial lamellæ, about 1.5 mm. apart on the periphery of the whorls, slightly

retractive, pinched together and more prominent, and slightly angularly bent, at the suture; these are crossed by low rounded threads, with wider interspaces, about a dozen on the penultimate whorl between the sutures; the surface is also finely sharply axially striate; the aperture is rounded, the outer lip slightly reflected and crenulate by the spiral threads, but not thickened; whorls more than five, closely adjacent; base (?); max. diam. 34; diam. at the truncate apex 10.0; alt. of five whorls (the apex lost) about 60.0 mm.

The type specimen of this fine species, consisting of internal and external casts, was collected about five miles south of the head of Port Moller, in the pass leading across Alaska Peninsula called Low Pass Cañon, U. S. Nat. Mus. 111072. Illustrations are in preparation.

(Published by permission of the Director of the U. S. Geological Survey.)

DESCRIPTION OF A MEXICAN LAMPSILIS.

BY H. A. PILSBRY AND L. S. FRIERSON.

Lampsilis iridella P. & F.

The shell is oblong, wider posteriorly, with the beaks at the anterior two-ninths of the length; anterior end rounded; posterior part sloping above, subtruncate at the end, compressed below the hinge. Surface glossy, smoothish, obliquely corrugated along the posterior slope (but sometimes very indistinctly so), and usually having a group of short impressed lines or furrows vertical to the basal margin, near the middle of the disk. Of a dull straw or pale greenish color, profusely marked with green rays, which are usually quite distinct and narrow. The valves are thin, nacre bluish silvery, very iridescent posteriorly. Cardinal teeth small, a single rather stout one in the right valve, two more compressed and generally subequal teeth in the left valve. Lateral teeth very narrow, double in the left, single in the right valve.

Length 49, alt. 26, diam. 15 mm.

Valles, Mexico. Type no. 93810 A. N. S. P., collected by Mr. A. A. Hinkley. Cotypes in collections of Hinkley and Frierson.

L. iridella, NAUTILUS, XXII, no. 8, pl. 12, two lower right hand figs.

This species was decided to be new when we studied Mr. Hinkley's Mexican shells in 1907, and so indicated in correspondence between the authors and Mr. Hinkley. It was figured as *Lampsilis iridella* in this journal for December, 1907. It is related to *V. popei* and *U. medellinus* (see NAUTILUS, Nov., 1907, p. 80).

In this connection attention may be called to the newly-described *Lampsilis salinasensis* Simpson, in Dall, Proc. U. S. Nat. Mus., 1908, p. 181, pl. 30, f. 3, type loc., Salinas River, Coahuila, also reported from Valles River, Valles, Mexico. This form is closely related to *L. fimbriata* Frierson, from the same place, figured on the same plate of the NAUTILUS with *L. iridella*.

NOTES.

A NOTE ON THE TYPE LOCALITY OF PALUDESTRINA SALSA, AT COHASSET, MASS.—The largest and finest specimens were found on rocks and eel-grass in about a foot of water and not more than three hundred yards from where the creek empties into Cohasset harbor. A dam and tide gates over which the salt water flows for only one or two hours at the top of each tide prevent the water at the spot where the shells were found from being as salty as one would expect, while a considerable amount of fresh water received by the upper part of the creek flows out on top of the salt water without mixing with it completely. Therefore the surface water is only brackish, not salt, and forms every winter very good black ice almost to the dam. Specimens were also found on floating plants about a mile further up the creek where the water has practically no salt in it. Dr. Pilsbry had specimens from both localities at the time he described the species.—OWEN BRYANT.

VALVATA HUMERALIS CALIFORNICA n. subsp. The shell is much more depressed than *V. humeralis*, the last whorl descending less; whorls convex below the suture, not flattened there as *V. humeralis* is. Alt. 2.7, diam. 4 mm. Bear Lake, San Bernardino Mts., California, collected by Mr. S. S. Berry.—H. A. PILSBRY.

HERON HELD PRISONER BY CLAM. BLOOMSBURG, PA.—Walk-

ing along the river at Beach Haven, Augustus Remaley saw a fine specimen of blue heron evidently unable to fly. Attracted by the beautiful bird's distress, he discovered that a clam or fresh water mussel had closed tightly about one of the bird's toes and held it so securely that it could not get away. In the bird's mouth was a small fish.—*N. Y. Herald, Aug. 16, 1908.*

TYPE OF AMPULLA BOLTEN.—This name, proposed in the Museum Boltenianum p. 110, for species of *Achatina*, *Limicolaria* and *Halia*, evidently has precedence for some part of this assemblage. I propose to restrict it to the last genus, *Ampulla priamus* Bolt. being the type.—H. A. PILSBRY.

THE DEVELOPMENT OF LITTORINA.—"The eggs of *L. litorea*, each enclosed in a hat-shaped capsule, are laid freely on the shore, not aggregated together in a gelatinous mass. There are trochosphere and veliger stages. *L. litorea* lives down in the zone of Laminaria and *Fucus serratus*. *L. obtusata* lives higher among *Fucus vesiculosus*; its larva leaves the egg as a veliger. *L. rudis* and *L. neritoides*, which live near high-water mark, are both viviparous. Thus the genus exhibits three stages in the evolution of the land from marine mollusca, with the suppression of larval forms with successive specialisations of habit."—M. M. TATTERSALL, M. Sc., in The Irish Naturalist, Nov. 1908, p. 238.

PUBLICATIONS RECEIVED.

REPORTS ON THE DREDGING OPERATIONS OFF THE WEST COAST OF CENTRAL AMERICA TO THE GALAPAGOS, TO THE WEST COAST OF MEXICO, AND IN THE GULF OF CALIFORNIA * * * BY THE U. S. FISH COMMISSION STEAMER "ALBATROSS" DURING 1891. REPORTS ON THE SCIENTIFIC RESULTS OF THE EXPEDITION TO THE EASTERN TROPICAL PACIFIC, ETC., "ALBATROSS," 1904–'05. By WILLIAM HEALEY DALL. Bull. Mus. Comp. Zool. xliii, no. 6, October, 1908.

The dredging operations of the "Challenger," "Blake" and "Albatross" have made us reasonably familiar with the deep water fauna of the western Atlantic, Caribbean Sea and Gulf, but hitherto practically nothing has been known of the deep water fauna off the west-

ern shores of Middle and South America, with which this Report deals. A comparison of the two faunas reveals many interesting facts. The known fauna of the eastern Pacific deep sea contains about 300 species of mollusks, belonging to 134 generic and subgeneric groups. The Antillean region possesses 174 groups and a much larger number of species. "There are practically no species common to the two regions except at the southern extreme of South America, where a few species extend northward on both shores of the continent, but do not reach the Antillean or Panamic regions."

The 300 species known from the Eastern Pacific deep sea fauna belong to 67 families, but 159 of them belong to only 8 families, of which the *Turritidæ* or *Pleurotomidæ* (57species), *Ledidæ* (35 species), *Dentaliidæ and Pectinidæ* are the most abundantly represented. The Antillean deep water fauna has 174 generic and subgeneric groups, against 144 in the Pacific, but of this number only 89 are common to the two regions. Very many characteristic and prolific groups in either fauna are unrepresented in the other. "These statistics would indicate, if confirmed by further researches, that the separation between the abyssal fauna of the Pacific and that of the Antilles is very ancient indeed, for in the shallows many of these groups are represented on both sides of the isthmus of Darien, yet have not yet succeeded in reaching the deep water." The total absence of *Triphoridæ*, *Cerithiopsidæ*. *Marginellidæ* and *Pyramidellidæ* in deep water on the Pacific side is especially remarkable.

Some 254 new species of mollusca are described. A very useful synopsis of the recent species and subspecies of *Argonauta* is given, 8 species being recognized. Much new and interesting material for the systematic student is given, especially in the *Terebridæ*, *Turritidæ*, *Solemyacidæ*, etc., and as in all of Dr. Dall's papers, there is a large store of information of value far beyond the limits of the particular fauna under consideration. The changes in nomenclature consequent on the resurrection of Bolten's Catalogue, are numerous, and important to those engaged in similar work. Several lists are appended, of interest to those engaged in faunistics: shells from the reefs and beaches of Easter Island and of Flint Island; and a single valve of a Pisidium, *Corneocyclas magellanicus* n. sp., was taken in Magellan Straits, evidently washed in from some adjacent stream.

As the pioneer work in a new fauna, this scholarly report will be welcomed by conchologists the world over.

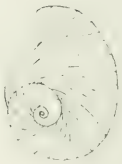
1

2

3

4

5



6

7

8

9

10

11

WALKER: NEW SPECIES OF SOMATOGYRUS AND CLAPPIA.

THE NAUTILUS.

VOL. XXII. JANUARY, 1909. No. 9.

NEW AMNICOLIDÆ FROM ALABAMA.

BY BRYANT WALKER.

In the fall of 1907 Mr. Herbert H. Smith explored about twenty-five miles of the Coosa River, lying between Chilton and Coosa counties. *Amnicolidæ* were very abundant, and more than 15,000 specimens have been passed under examination. Among them were the several species herein described, which appear to be new.

The principal collecting points were Cedar Island, three miles above Waxahatchee Creek (in THE NAUTILUS, xxi, p. 128, this island was erroneously stated to be that distance above Yellowleaf Creek); The Bar, two miles further down stream, and two and one-half miles above Yellowleaf Creek (the second creek of that name); Butting Ram Shoals, five miles below The Bar; Higgins Ferry, seven miles further down; and Duncan Riffle, seven miles below the Ferry. Duncan Riffle is about twenty-four miles above Wetumpka. This interval still remains for some enterprising collector to explore.

All of the Coosa River species collected by Hinkley were also found by Smith, with the exception of *Som. aureus*. *S. hinkleyi*, *crassus* and *nanus* occurred in great quantity, the latter being the most numerous. *S. coosaensis*, *obtusus* and *aldrichi* were less abundant, but were fairly common in some localities. *S. constrictus* still remains the rarest of the Coosan *Somatogyri*, a bare half-dozen representing the total catch. An interesting "find" was that of *S. substriatus*, originally collected by Hinkley at Florence, Ala., and Columbus, Miss.

As none of the *Amnicolidæ* collected by Mr. Smith in his journey

by boat down the Coosa from Rome, Ga., to Widuska Shoals, Shelby county, Ala., in 1904–5, have been worked up, it is not at present possible to say how far up the river any of these species extend.

SOMATOGYRUS DECIPIENS n. sp. Pl. vi, figs. 10 and 11.

Shell obtusely conic, imperforate, thick, solid, light greenish-yellow, smooth, lines of growth very fine and inconspicuous. Spire elevated, obtuse; whorls 4, roundly shouldered below the suture, which is well impressed; body whorl large, shouldered above, flattened on the sides and obliquely angled below and descending to the axis. Aperture very oblique, obovate, obtusely angled above and widening toward the base, which is slightly emarginate. Columella concave, with a heavy, wide, flattened callus which extends over the parietal wall. Lip sharp, heavily thickened within.

Alt. (fig. 11) (apex eroded) $3\frac{1}{2}$, diam. $2\frac{1}{2}$ mm.

Types (No. 28431, Coll. Walker) from the Coosa River at The Bar, Chilton county, Ala. Co-types in the collections of T. H. Aldrich, G. H. Clapp, John B. Henderson, Jr., and the Philadelphia Academy. Also from the Coosa at Cedar Island, Butting Ram Shoals, Higgins Ferry, Duncan Riffle and other points in Coosa and Chilton counties, collected by Smith, and from the Coosa at Wetumpka, five miles above Wetumpka, Wilsonville, Fort William, and Montevallo, collected by Hinkley.

A careful study of many hundreds of specimens has convinced me that under the description of *Somatogyrus hinkleyi* (NAUTILUS, xxii, p. 135) I confounded two distinct species, one imperforate, and the other perforate. As both the figured types of *hinkleyi* fortunately belong to the same form, the perforate one, that species will retain the name under the amended description given below. The imperforate form is the species here described as *decipiens*. The distinctive characters of the two species are so marked that, once appreciated, there is no difficulty in separating them at sight, and it is a matter of some chagrin that the difference was not realized in the first instance.

S. decipiens is a smaller, thicker species than *hinkleyi*, and always imperforate, without any suggestion of an axial groove. While both species are alike in the elevation of the spire, *decipiens* is at all stages of growth distinctly biangulate, with the intervening side of the whorl flattened; in some instances the lower angulation becomes a distinct carina, but this is not usual.

For comparison with the similar state in *S. hinkleyi*, a young specimen of $3\frac{1}{2}$ whorls ($2\frac{1}{4}$ x $1\frac{1}{2}$ mm.) is also figured. (Fig. 10.)

The following amended description should be substituted for that originally published for

SOMATOGYRUS HINKLEYI Walker. Pl. vi, figs. 8 and 9.

Somatogyrus hinkleyi Walker, NAUTILUS, xvii, 135, pl. v, figs. 1 and 2.

Shell globose, conic, narrowly umbilicate when young and perforate when mature; light horn-colored, smooth, growth-lines scarcely evident. Spire elevated, obtuse; whorls 4–$4\frac{1}{2}$, those of the spire convex, body whorl large, more or less shouldered above, but regularly rounded at the periphery, suture deeply impressed. Aperture large, rounded above, somewhat flattened at the base, and decidedly angled at the junction of the lip with the base of the columella, and angular at the upper insertion of the lip; lip simple, acute, in aged examples somewhat thickened within. Columella heavy, callused, flattened and nearly straight, reflected over and nearly concealing the narrow umbilicus, callus thinner on the body wall.

For better illustration and comparison with *S. decipiens* I have refigured the original mature type (fig. 8) and have added another of a young shell (fig. 9) of $3\frac{1}{2}$ whorls ($2\frac{1}{2}$ x 2 mm.) for the purpose of showing the open umbilicus at that stage; the thin, shining shell and rounded whorls are very characteristic.

S. hinkleyi, when mature, has a larger, thinner shell than *decipiens*, the columellar callus is not so heavy, and the persistent perforation, very rarely entirely obliterated, as well as the general shape, are distinctive.

This species was found by Mr. Smith at the localities mentioned in connection with *S. decipiens*.

SOMATOGYRUS HENDERSONI n. sp. Pl. vi, fig. 2.

Shell globose, perforate, thick, solid, greenish-horn-color, smooth, lines of growth slight, but regular. Spire short, subacute, whorls 4–$4\frac{1}{2}$, flattened above, and roundly shouldered, body-whorl very large, inflated, somewhat constricted immediately below the suture, which is deeply impressed and then flatly expanded and roundly shouldered. Aperture large, subcircular, expanded; lip sharp, callously thickened within, rather abruptly bent in above and meeting the parietal wall at nearly a right angle, broadly rounded below and

curving regularly into the columella. Columella narrow, thickened, rounded and concave, separated below from the body-whorl by a small but profound umbilicus and a strong axial groove, adnate only on the parietal wall, which is heavily callused. Alt. (apex eroded) 4.5, diam. 4.5 mm.

Types (No. 28432, Coll. Walker) from Coosa River at Duncan's Riffle, Chilton County, Ala. Co-types in the collections of T. H. Aldrich, G. H. Clapp, J. B. Henderson, Jr., and the Philadelphia Academy. Also from the Coosa at Wilsonville, Ala.

This species is about the size and general appearance of *S. depressus* Tryon, and *sargenti* Pils. It differs from the former in its heavier shell, sub-sutural constriction, large umbilicus and strong axial groove. The latter species is rather larger, not so thick and imperforate. A single specimen from Williamsville was recently sent in by Mr. Hinkley, which was not included in the material sent to me in 1904.

Named in honor of Mr. J. B. Henderson, Jr., who has been a hearty supporter of Mr. Smith's work on the Coosa.

Somatogyrus pygmæus n. sp. Pl. vi, fig. 3.

Shell minute, globose-conic, imperforate, rather thin, light greenish horn-colored, smooth, lines of growth indistinct. Spire obtusely elevated, whorls 4, convex, suture deeply impressed; body whorl large, convex, regularly rounded, impressed at the axis. Aperture subcircular, not much expanded. Lip simple, sharp, thin, regularly curved from the upper to the columellar extremity. Columella concave. Columellar callus narrow, flattened, closely appressed to the body whorl and extended over the parietal wall to the upper insertion of the lip.

Alt. (apex eroded) 2.5, diam. 2 mm.

Types (No. 28433, Coll. Walker) from the Coosa River, at The Bar, Chilton county, Alabama. Co-types in the collections of T. H. Aldrich, G. H. Clapp, J. B. Henderson, Jr., and the Philadelphia Academy.

About twenty-five examples of this diminutive species were collected at The Bar. It did not occur elsewhere. I have been wholly unable to identify this form as the young of any of the associated species. Though so small, the shells have every appearance of maturity. Compared with young *S. nanus* of the same size, *pygmæus* differs in the thinner shell, regular convexity of the whorls and

lighter columellar callus. It is easily distinguished from other described species by its size.

CLAPPIA, n. gen.

Shell small, globose-turbinate, narrowly, but deeper *umbilicate*, aperture large, lip simple, *columellar lip simple*, adnate to body-whorl only at the extreme upper portion, oblique, expanded and subangulate to its union with the basal lip, operculum corneus, paucispiral, *nuclear whorls large and subcircular, slowly and gradually increasing.*

Rachidian tooth of the radula short and broad; intermediate tooth with sub-quadrate body with a strong tooth projecting from the infero-anterior angle and a large peduncle; laterals multicuspid: Formula of the denticles: $\frac{6-1-6}{4-4}$ 10–1–10, 50+, 50+ (Fig. 7).

Type: *Clappia clappi* Walker.

This genus stands close to *Somatogyrus*, but differs in several important particulars, which forbid the reference of the type species to that group.

The central tooth of the radula is very similar both in shape and in the arrangement and number of the denticles to that of *S. depressus* as figured by Stimpson. But the intermediate tooth lacks the perforation, which is found in that species, and has a prominent tooth at the infero-anterior angle which is lacking in the other. The laterals are multicuspid. In this respect, *Clappia* stands in the same relation to *Somatogyrus* that *Cincinnatia* does to *Amnicola.*

In shell characters, *Clappia* differs from *Somatogyrus* in the conspicuous deep umbilicus, the straight, thin inner lip without any callus thickening, which is entirely separate from the body whorl, except for a very short distance at the upper extremity.

The operculum is also very different. In all the species of *Somatogyrus* examined, the nuclear whorls of the operculum are very small, while the last is enormously expanded (see Fig. 6, *S. subglobosus*, Fig. 5, *S. depressus*). In *Clappia* (Fig. 4), on the other hand, the nuclear whorls are large and nearly circular, and form nearly one-half of the whole operculum. Indeed, in looking at the operculum *in situ*, the first impression is that it is completely circular as in *Valvata.*

CLAPPIA CLAPPI n. sp. Pl. vi, figs. 1, 4 and 7.

Shell small, globose-turbinate, narrowly and deeply umbilicate;

rather thin, translucent, pale horn-color, smooth, shining, lines of growth very fine, close and regular; spire obtuse. Whorls 3½, round, very convex, rapidly increasing toward the aperture, separated by a deep suture. Aperture large, slightly oblique, scarcely expanded, subcircular, equally rounded above and below, but flattened on the columellar side. Columellar lip thin, straight, oblique, adnate to the body-whorl only at the upper extremity, emarginate in the central portion, below which it is expanded, forming a rounded angle at its junction with the basal lip. Lip thin, sharp, not expanded nor callously thickened within. Operculum paucispiral, nuclear whorls large and subcircular. Animal black.

Alt. (apex eroded) 3, diam. 3 mm.

Types (No. 28434, Coll. Walker), from the Coosa River at Duncan's Riffle, Chilton County, Ala. Cotypes in the collections of T. H. Aldrich, Geo. H. Clapp, John B. Henderson, Jr., and the Philadelphia Academy. Found also at The Bar, Butting Ram Shoals and Higgins' Ferry.

Deprived of its operculum, this species at first sight, from its general shape, rounded whorls and deep umbilicus, would be taken for a *Valvata* allied to *V. sincera* Say. But the straight columellar lip and the decided projection of the lip at its junction with the peritreme show its affinity to *Somatogyrus*.

The peculiarities of the radula and operculum have been sufficiently stated under the generic description. I am indebted to Dr. Pilsbry for the figure of the dentition. It seems eminently proper that this very distinct addition to the fauna of Alabama should both generically and specifically bear the name of Mr. Geo. H. Clapp, the original promotor of the explorations of Mr. H. H. Smith, which have added so much to our knowledge of the mollusca of that State.

Explanation of Plate VI.

Figures 1, 3, 9 and 10 are on the same scale, x8.

Figures 2, 8 and 11 are x6.

Figs. 1, 4 and 7. *Clappia clappi.* Duncan's Riffle, Coosa R., Ala.

Fig. 2. *Somatogyrus hendersoni.* Duncan's Riffle, Coosa R., Ala.

Fig. 3. *Somatogyrus pygmæus.* The Bar, Coosa R., Ala.

Fig. 5. *Somatogyrus depressus.* Watertown, Wis.

Fig. 6. *Somatogyrus subglobosus.* Big Muddy R., Blairville, Ills.

Fig. 8. *Somatogyrus hinkleyi.* Coosa R., Wetumpka, Ala.

Fig. 9. *Somatogyrus hinkleyi.* Coosa R., The Bar, Ala.

Figs. 10 and 11. *Somatogyrus decipiens.* Coosa R., The Bar, Ala.

THE BREEDING SEASON OF UNIONIDÆ IN PENNSYLVANIA.

BY DR. A. E. ORTMANN.

Since C. T. Simpson published his new system of the *Unionidæ* (Proc. U. S. Nat. Mus. 22, 1900), which is founded, in a large part, upon the "marsupium" of the female, this latter organ must be regarded as one of the most important features of the soft parts of the mussels, and should be known in every species. Yet there is a large number of species, in which it has never been seen by anybody. That certain species are very rarely found with the marsupium developed, is, in my opinion, chiefly due to the fact that they are not easily obtained at the period when they are gravid. As Sterki has first suggested (NAUTILUS, 9, 1895, p. 91), there are *two groups* among our mussels with regard to the period of gravidity [1]): *summer breeders* and *winter breeders*. In the summer breeders the short "breeding season" falls into the early summer months (May, June, July); now since many of the species which belong or may belong here are characteristic for the larger rivers, avoiding smaller streams, and since just at this time the rivers very generally are swollen and muddy by copious summer-rains, it is practically impossible to collect them in the gravid condition.

During the summer of 1908 we had exceptionally dry weather in our region; the stage of the rivers in Pennsylvania was already in the beginning of July very low, and thus the writer succeeded in finding several species in a gravid condition, which generally at that season are out of reach. In addition, he has collected other species in the smaller streams at various seasons, and has found gravid females, both of summer and winter breeders. The following is a list of them, which also intends to give the previous records for those species which are found in Pennsylvania: [2]

---

[1] In order to avoid misunderstanding, I want to state expressly that by "period of gravidity" or "breeding season" I mean the time when the gills, or part of the gills, which forms the "marsupium," are filled with eggs or embryos.

[2] See: Lea, I; Observations, II, 1838, p. 51 ff.; III, 1842, p. 231; VII, 1860, p. 221; X, 1863, p. 412, etc.; Sterki, V, NAUTILUS, 9, 1895, p. 91; 12, 1898, p. 18; Amer. Natural., 37, 1903, p. 103; Baker, F. C., Bull. Chicago Ac., 3, 1898 (passim); Conner, C. H., NAUTILUS, 21, 1907, p. 87.

GROUP A. WINTER BREEDERS.

Truncilla triquetra Raf. Found gravid by the writer repeatedly in the months of September and October.

Truncilla perplexa rangiana Lea. Winter breeder (Sterki, '95). Found gravid in September.

Micromya fabalis Lea. July–August (Lea, III, '42).

Lampsilis ventricosa Barn. Winter breeder (Sterki, '95); autumn (Lea, III, '42); March, October (Lea, *ibid.*). Found gravid by the writer in all months from May to October. Marsupium partly empty (ovisacs extruded) on May 11; marsupium just beginning to be filled, July 30. (Breeds apparently "all the year round." See below.)

Lampsilis ovata Say. Autumn (Lea, III, '42); November (Lea, X, '63). Found gravid in August, September, October. (This is merely a variety of *L. ventricosa.*)

Lampsilis cariosa Say. October (Lea, II, '38). Found gravid in August.

Lampsilis ochracea Say. June and November (Lea, II, '38).

Lampsilis multiradiata Lea. Autumn (Lea, III, '42); July, August (Lea, *ibid.*). Found gravid in May, June, August, September, October. Only few specimens being found in June and July, it is uncertain whether there is an "interim" in the summer.

Lampsilis luteola Lam. March, July–August, October (Lea, III, '42); July (Baker, '98). I found gravid specimens in April, May, June, July, August, September, October. The species is a typical winter breeder, only the end of one season and the beginning of the next partly overlap in summer. In June, and chiefly in the beginning of July, sterile females (with the marsupium not charged) are much more frequent than in other seasons, while gravid females are very rare at the same time.

Lampsilis radiata Gmel. "All the year round" (Conner, '07); November (Lea, II, '38); May (Lea, X, '63). Discharge of ovisacs observed from November to March (Lea, X, '63).

Lampsilis ligamentina Lam. Winter breeder (Sterki, '95); autumn (Lea, III, '42). Found gravid by the writer in August, September, October, but not in July. Among numerous specimens collected, July 8, '07, July 3, 10 and 13, '08, not a single gravid female was discovered. The earliest date for the latter is August 3, but from that time on they were found regularly. This species pre-

fers the larger rivers, and thus no dates could be secured for the spring months, yet the "interim" in July is very sharply marked.

Lampsilis orbiculata Hildr. Autumn (Lea, III, '42). Found gravid in August and September.

Lampsilis recta Lam. Winter breeder (Sterki, '95); autumn (Lea, '42). Found gravid in July, August, September, October. No records at hand for the early summer.

Lampsilis nasuta Say. "All the year round" (Conner, '07); winter breeder (Sterki, '95); November (Lea, II, '38). I found this species gravid in September (Delaware River), and on June 2 and 3 (in Lake Erie), when numerous gravid females were found.

Lampsilis iris Lea. I found three gravid females on May 11.

Lampsilis parva Barn. Winter breeder (Sterki, '95); May and November (Lea, VII, '60). Extrusion of ovisacs observed by Lea (*ibid.*) in May.

Lampsilis (*Proptera*) *alata* Say. Winter breeder (Sterki, '95); autumn (Lea, III, '42). Found gravid end of August, September, October.

Lampsilis (*Proptera*) *gracilis* Barn. Winter breeder (Sterki, '95); autumn (Lea, II, '42). Found gravid in September.

Obovaria retusa Lam. Autumn (Lea, III, '42). I found a gravid female of this species on August 29, '08.

Obovaria circulus Lea. Winter breeder (Sterki, '95); autumn (Lea, III, 42); March, July–August (Lea, *ibid.*). I found gravid females on May 27, '08. Both forms *O. circulus* and *lens* are included here: they pass into each other.)

Obovaria ellipsis Lea. Winter breeder (Sterki, '95); autumn (Lea, III, '42).

Plagiola securis Lea. Autumn (Lea, III, '42). Gravid females not rare in September and October.

All species mentioned so far possess the "Lampsilis-type" of marsupium, *i. e.*, the posterior part of the outer gills is charged, at the period of gravidity, with eggs or embryos contained in distinct ovisacs. When not gravid, this part of the gills differs in structure from the rest, and females are always recognizable.

Cryptogenia irrorata Lea. Winter breeder (Sterki, '95); autumn (Lea, III, '42).

Marsupium very peculiar, but allied to the Lampsilis-type.

Ptychobranchus phaseolus Hildr. Winter breeder (Sterki, '95);

autumn (Lea, III, '42). Found gravid in August, September, October. A specimen found on May 11, '07, had most of the ovisacs discharged. None of the numerous specimens collected by the writer in June and July were gravid.

The peculiar shape of the marsupium of this species is well known.

In the following species, belonging to Group A, the marsupium occupies the whole of the outer gills, and while in *Strophitus* distinct "placentae" (Sterki) are developed, such structures or ovisacs are not present in the rest.

Strophitus undulatus Say. Autumn (Lea, III, '42); March, October (Lea, *ibid.*); September, December (Lea, II, '38); discharge of placentæ observed in January and February (Lea, X, '63). I found this species gravid in the months of July, August, September, October; also in May. The latest date is May 22, '08 (one out of eleven individuals). Among numerous specimens collected on May 14 and May 27, '08, no gravid females were present, and during the month of June such were never found, although a good number of specimens were collected. The earliest date again is July 11. This gives an "interim" from the end of May to about the middle of July.

The eastern *S. undulatus* Say is absolutely undistinguishable from the so-called *S. edentulus* Say of the western waters.

Anodonta cataracta Say. Breeding season, eight months during the year; the interim May to October (Conner, '07); gravid in October and November (Lea, II, '38). I have seen gravid specimens collected on July 23, '08, and August 21, '08. The first date, no doubt, represents an exceptional case: there was only a single gravid individual among forty to fifty specimens. The other date (also a single individual, but only one found at that date) possibly marks the beginning of the season. At any rate it is very probable that the breeding season occasionally lasts longer than indicated by Conner, and may be extended in individual cases beyond May and may begin earlier than October, as is the case in other winter breeders.

Anodonta imbecillis Say. Autumn (Lea, III, '42); March (Lea, *ibid.*). Found gravid May 21, '08 (outlet of Lake Leboeuf, Erie county), and June 2, '08 (Lake Erie). This species is hermaphroditic, according to Sterki (NAUTILUS, 12, '98, p. 87).

Anodonta grandis Say. Autumn (Lea, III, '42); July, August (*ibid.*); October (Baker, '98). In Pennsylvania gravid females are frequent in August, September, October. I have found a single

gravid female on May 22, '08, out of a large number collected. Among numerous specimens collected on April 24, June 23, July 17 none were gravid. Thus the "interim" appears to extend over the month of May to July, with occasional individual exceptions.

Anodontoides ferussacianus Lea. Autumn (Lea, III, '42); October (*ibid.*). Found gravid in May, August and October. Among a dozen specimens, collected June 5, '08, in Little Shenango River, and among numerous specimens of the var. *subcylindraceus* Lea, collected on June 2, '08, in Lake Erie, not a single one was gravid. This would establish an interim at least in June. No dates are at hand for July.

Symphynota compressa Lea. Autumn (Lea, III, '42); March, September (Lea, *ibid.*). Gravid in May and beginning of June (June 2 in Lake Erie; only part of the outer gills charged). No gravid females taken during the rest of June, and during July, but only a small number of specimens was secured during this time. Beginning August 6, all through the month, and during September and October, gravid females were abundant. The color of the marsupium is very variable in this species: whitish, pink, orange, brown, and probably depends on the stage of development of eggs and embryos.

(*To be continued.*)

NOTES.

SHELLS NEW TO THE NEW ENGLAND FAUNA.—In a very small portion of shell-sand gathered by Mr. John Robinson at Hampton Beach, New Hampshire, I discovered a genus new to America, namely *Homalogyra atomus* Phil. A subsequent visit to this place enabled me to add a number of forms new to the New England Coast north of Cape Cod. Among those thus far determined is a *Scissurella*, probably *crispata* Flem., and *Cœcum pulchellum* Stimp. A few years ago Miss Marjorie C. Newell discovered specimens of *Tagelus devisus* Spengl. on Coffin's Beach, and Miss M. W. Brooks has detected a specimen of this species at Hampton Beach.

Later I hope to make an extended paper with illustrations of these and other new additions to our molluscan fauna.—EDWARD S. MORSE.

In his "Economic Zoology, an introductory text-book in Zoology with special reference to its applications in Agriculture, Commerce and Medicine," by Herbert Osborn, M. Sc., 1908, the chapter on Mollusca (p. 147–173) is partially illustrated by original figures. Figs. 94 and 95, labeled "Common Snail, *Patula alternata*" is apparently *Polygra profunda!* Except for a very brief allusion to the pearl and pearl-button industry, the only "economic" mollusks mentioned are the oyster and *Mya arenaria*, although to go no further away than our own coast, commercially the round clam or quahog is much the more important of our clams, and the scallop industry has assumed large proportions.

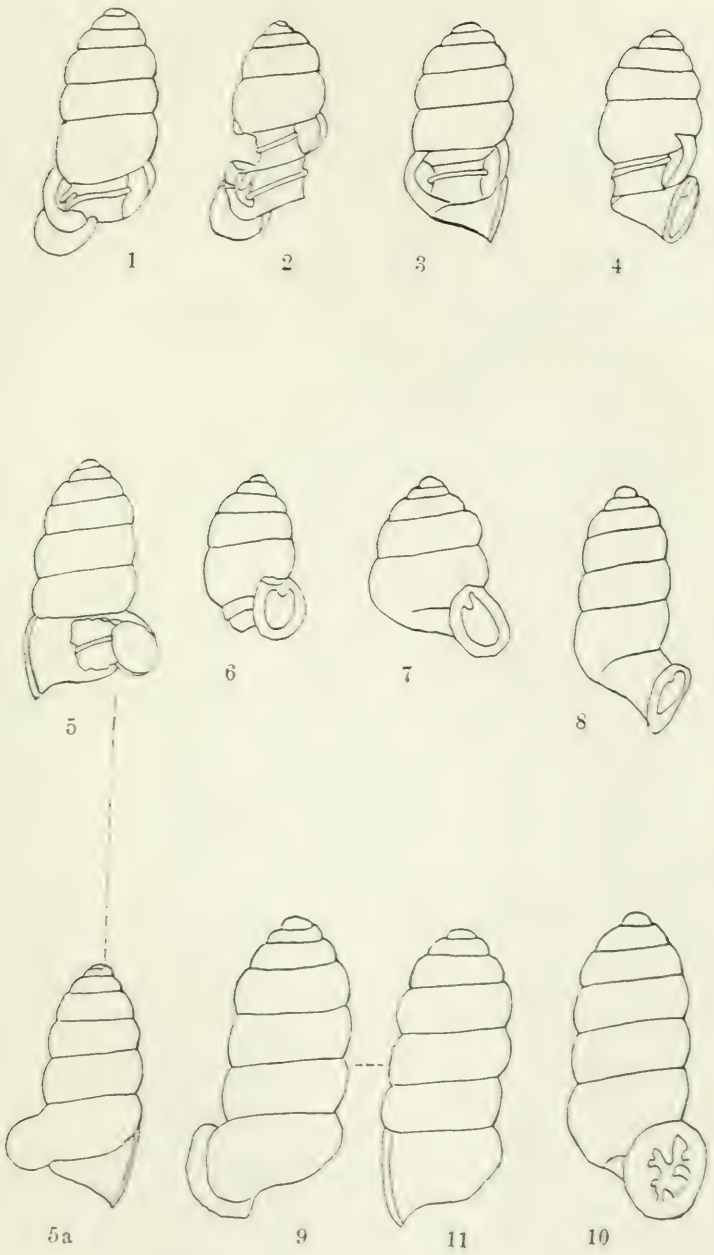
Alcadia pusilla intermedia, n. var. Shell intermediate in size between *A. pusilla* and *A. hollandi*, alt. 5.2, diam. 7.7 mm.; operculum roughened externally much as in *A. hollandi*, its columellar margin with sharp comb-like costulæ. Jamaica, (S. Raymond Roberts.) —H. A. Pilsbry.

Bifidaria tuba intuscostata Clapp. Plate VII, figs. 1, 2, 3, 4, Broken shells showing internal lamella × 10. 5, 6, 7, 8, Abnormal shells × 10. 9, 10, 11 Typical × 12.

PUBLICATIONS RECEIVED.

Description of New Cretaceous and Tertiary Fossils from the Santa Cruz Mountain, California. By Ralph Arnold. (Proc. U. S. Nat. Mus. xxxiv, p. 345, plates 31–37, 1908.) Descriptions of the various geological formations with lists of species, followed by descriptions of some thirty-seven new species.

Descriptions and Figures of some Land and Fresh-water Shells from Mexico, Believed to be New. By Wm. H. Dall, (Proc. U. S. Nat. Mus. xxxv, p. 177, plates 29–33, 1908.) A new species of Coelocentrum (*C. palmeri* Dall and Bartsch) forms the type of a new section *Crossostephanus*. Three new *Streptostylas*, one *Euglandina* and one *Lampsilis* are described and figured. *Anodonta coarctata* Anton and *Diplodon websteri* Simpson are also figured. The latter from New Zealand, was described in The Nautilus, Vol. xvi, p. 30, 1902.



BIFIDARIA TUBA INTUSCOSTATA CLAPP

THE NAUTILUS.

VOL. XXII. FEBRUARY, 1909. No. 10.

A WEEK AT CLAIBORNE, ALABAMA.

BY REV. H. E. WHEELER.

A part of my October vacation was spent with a party of geologists on a house-boat trip from Tuscaloosa, on the Warrior river, to Jackson, on the Tombigbee. The party consisted of the State Geologists from South Carolina, Georgia, Florida and Alabama, namely, Mr. Earle Sloan, Mr. T. W. McCaloie, Dr. E. H. Sellards, Dr. Eugene A. Smith and Dr. F. W. Prouty, besides Dr. George Little, of Tuscaloosa; Dr. Roland M. Harper, of New York, botanist; Hon. T. H. Aldrich, of Birmingham, paleontologist; and Dr. T. Wayland Vaughan, of the U. S. Geological Survey, who was studying in detail the correlation of the coastal plain geology of the Southern States.

One of the results of the expedition was the confirmation of our Alabama nomenclature for the cretaceous and tertiary formations so typically illustrated in this State. Another result was the fine series of fossils collected along the route.

From Jackson some of the party went to the sections about Mobile to study the Grand Gulf formation, while I made my way to the classic locality—Claiborne, on the Alabama river. To one who has but recently delved into the mysteries of paleontology no more encouraging formation could be desired than this. Made famous by the early work of Lea and Conrad, a fascination for every student since, it will not fail to yield treasures new and old to any zealous collector. A year ago I gathered a quantity of shells there, enough to fill the winter's evenings with rare pleasure, but this year I was even more fortunate.

The beautiful *Corbis lamellosa* Lam. was found in a thin layer of white sand in the ferruginous bed—quantities of them in perfect condition. Just as I was leaving I picked up a *Cypræa nuculoides* Ald.,[1] so far as I know never before reported from this locality. A fine large *Fusus* (*Clavilithes*) *protextus* Con. rewarded my laborious digging, as well as perfect specimens of most of the common species. It was on my last visit that I was fortunate enough to find the very rare *Cancellaria priama* Harris,[2] the type of which had unfortunately been broken. I obtained two enormous *Trochiformis infundibulum* Lea, and among other interesting, though not in every case rare, species may be mentioned the following: *Pisania claibornensis* Whitf., *Lutraria papyria* Con., *Avicula limula* Con., *Papillina papillata* Con. (very rare), *Fusus inauratus* Con., *Conus sauridens* Con., *Cornulina armigera* Con., a *Melongena* n. sp., *Limopsis cuneus* Con., *Fissurella tenebrosa* Con., *Siguretus declivis* Con., *Actæon inflatior* Meyer, *Mathilda leana* Ald., *Leiorhynus prorutus* Gabb.

The locality ought also to be interesting to the collector of recent shells. I noted on the bluff the dainty *Glandina rosea* Fer.

Passing through the overgrown and deserted streets of the village,[3] one would hardly suspect that in former times it was important enough to be visited by General Lafayette (1825) in his tour of the States. But the old Masonic Hall in which he spoke still stands, though now removed to Perdue Hill, two miles away. Here (in Claiborne) Conrad taught the children of a wealthy family while he named the treasures of the ancient eocene sea. Two of Alabama's Governors—Bagby and Murphy—were residents of Claiborne when elected, and Charles Tait, to whom the scientific world is indebted for its first knowledge of this famous bed, was Alabama's first Federal Judge. On the "Bluff" itself stood old "Fort Claiborne," whose guns frowned vengeance on the crafty Choctaws; but gone now is the glory of the once proud river town, scattered are its families, and almost past recovery are its traditions.

But for how many years to come will these ancient seas continue to give up the secrets entrusted to them? Monuments that crumble and yet survive; frail shells on which the order of creation is too finely graven for human skill to imitate.

Blocton, Alabama.

---

[1] Nautilus, Vol. XVI, p. 98, pl. 3.

[2] Bull. Am. Pal., Vol. I, p. 49, pl. 1, fig. 20.

[3] There are less than fifty inhabitants (white) in Claiborne to-day.

THE BREEDING SEASON OF UNIONIDÆ IN PENNSYLVANIA.

BY DR. A. E. ORTMANN.

(*Concluded from page 95.*)

Symphynota viridis Conr. August 24, '08, four gravid females were found among a dozen specimens; of 35 specimens collected by Dr. D. A. Atkinson on July 11, '08, not a single one was gravid.

Symphynota costata Raf. Autumn (Lea, III, '42); March, October (Lea, *ibid.*). I found gravid specimens in April, May (latest date, May 26), and then again in August (earliest date, August 9), September, October. Numerous specimens were collected in June and July, but none of them was gravid.

Symphynota complanata Barn. Autumn (Lea, III, '42); March (Lea, *ibid.*). Gravid females found on May 14, '08.

Alasmidonta undulata Say. September and October (Lea, II, '38). Gravid females on July 18 and August 12.

Alasmidonta heterodon Lea. August, September (Lea, II, '38); May (Lea, X, '63).

Alasmidonta marginata Say. October and December (Lea, II, '38). The western form was found gravid in August, September, October. Out of a number of specimens collected on June 5, 8 and 22 none was gravid. No dates at hand for July. The eastern form was found gravid on August 13. The western form (= *truncata* Wright = typical *marginata* Say) is hardly distinguishable from the eastern (=var. *varicosa* Lam.), see Pilsbry and Fox, NAUTILUS, '01, pp. 16 and 17).

GROUP B. SUMMER BREEDERS.

Some of the summer breeders (*Unio*, *Pleurobema*) have the outer gills only serving as marsupium, in others (*Quadrula*) all four gills are supposed to assume this function in the breeding season. Yet in many *Quadrulas* this condition is unknown, and, as we shall see below, the arrangement of the species into genera will need revision and correction. I enumerate the species here according to Simpson's Synopsis.

Unio gibbosus Barn. Summer breeder (Sterki, '95); July, August (Lea, III, '42). I found gravid females of this common species in June and July, and a single belated one on August 13. Hun-

dreds of individuals were collected in April, May, August, September. October, but no gravid females were among them.

Unio crassidens Lam. Summer breeder (Sterki, '95). I collected numerous specimens in July, August, September, October, but never found a gravid female. I never had a chance to get this species earlier in the season.

Unio complanatus Dillw. "But once annually, from April–May to July–August" (Conner, '07); May (Lea, X, '63). I collected this species only in the month of August, and consequently never found it gravid.

Pleurobema clava Lam. July–August (Lea, III, '42). Found gravid on June 18 and July 10. Specimens collected on May 14 and in August, September and October were not gravid.

Pleurobema aesopus Green. Summer breeder (Sterki, '95). Gravid on July 3 and 13, '08. Never found in the gravid state during August, September, October, when many were collected.

Sterki ('95) places this with the species, in which all four gills are charged, and (Pr. Ohio Ac., 4, '97, p. 391) with the genus *Quadrula*. Yet according to my observations only the outer gills serve as marsupium, and are distinguished at that time by a very peculiar red color; already Lea (X, '63, p. 432) enumerates this species among those which have red eggs, but he saw them only in the ovarium. Yet this "red" of the gills is entirely different from that of certain gravid species of *Quadrula*, being rather of a "lilac" hue.

Quadrula undulata Barn. Summer breeder (Sterki, '95). I collected many specimens in August, September, October, but did not find gravid females. The only one was found on July 3, '08; it had all four gills charged, which were whitish (not red).

Lea (X, '63, p. 417) says that only the outer branchiæ serve as marsupium, while Sterki ('95) puts it in group B, where all four branchiæ are said to be charged.

Curiously enough, Sterki ('95, p. 93) places the closely allied *U. multiplicatus* Lea (= *Q. heros* Say) with his group A (winter breeders), giving the date November 1, and says that also the marsupium is of the type A (*Lampsilis* type). Since the latter has been described and figured by Lea (VII, '60, p. 122, pl. 30, f. 105), and is distinctly of the *Quadrula* type, with all four gills charged, I believe that we have to deal with a *lapsus calami* for *U. multiradiatus* Lea.

Quadrula lachrymosa Lea. May (Lea, III, '42).

Quadrula pustulosa Lea. Summer breeder (Sterki, '95).

Quadrula rubiginosa Lea. July–August (Lea, III, '42); June (Baker, '98). I found this species gravid on May 27, June 30, July 3 and July 8. The marsupium corresponds to the account given of it by various writers; it is formed by all four gills, which are at that time deep red.

Quadrula subrotunda Lea. Summer breeder (Sterki, '95). Found gravid July 3 and July 13. During late summer and fall no gravid females were found, although many specimens were collected. All four gills are charged and of deep red color.

Quadrula kirtlandiana Lea. One gravid female was found on August 2, '07, among hundreds of specimens collected; all four gills were charged, and red. Later in the season, in August, September, October, no gravid females were seen.

Quadrula coccinea Conr. Found gravid on June 18, '08 (Neshannock Creek, McKean Co., collected by Mr. Dennis Dally on June 22, '08. There were, altogether, about a dozen of them, and in every case the marsupium did not agree with the type of the genus *Quadrula*, for only the outer gills were charged in their whole extent, and were whitish. This would remove this species from the genus *Quadrula*, and would place it with *Pleurobema*. (Baker, '98, p. 80, gives a description of the soft parts, and says "four gills used as marsupium," but this may not be founded upon personal observation, but may have been inferred from the systematic position of the species.)

Tritogonia tuberculata Barn. Gravid, according to Sterki (NAUTILUS, 21, '07, p. 48) on June 10, '07, and marsupium formed by all four gills. This would place the species with the genus *Quadrula*, where it would group with *Q. trapezoides* Lea. Since the specific name is preoccupied in this genus, and since none of the synonyms are available, a new name should be found, and I propose here: *Quadrula tritogonia* nov. nom. (I have discussed this point with Dr. Sterki, and he is of the same opinion.)

Of the other species of *Quadrula* found in Western Pennsylvania, *Q. hippopæa* Lea, *cylindrica* Say, *metanevra* Raf., *cooperiana* Lea, *obliqua* Lea, *pyramidata* Lea, *tuberculata* Raf., I have never seen gravid females, and nothing is known about their marsupium and breeding season.

The above observations on the breeding seasons of Pennsylvanian

Unionidæ fully bear out Sterki's division into two groups: summer and winter breeders. The breeding season of the summer breeders is short (maximum hardly four months), while in the winter breeders this season is prolonged, extending from late summer, through the winter into spring. Yet it must be borne in mind that probably in the single individual the breeding season does not fully occupy the whole length of the term, since it has been repeatedly observed that the embryos and ovisacs are discharged at various times, even in the beginning of the winter.

In some species belonging to the group of winter breeders the period of gravidity may be extremely long, so that the end of one breeding season (in May, June, July) may overlap with the beginning of the next (June, July, August), and such species may appear to breed "all the year round." This has been hinted at already by Sterki, and Conner gives the following instances: *Lampsilis radiata* and *Lampsilis nasuta*. My own observations make this condition probable in *Lampsilis ventricosa* and *Lampsilis luteola*. Yet in others an "interim" is very distinct in the early summer. This is the normal condition, according to Sterki, and has been found to be true for *Anodonta cataracta* by Conner, and by my observations it is made more or less probable for *Lampsilis ligamentina*, *Ptychobranchus phaseolus*, *Strophitus undulatus*, *Anodonta grandis*, *Anodontoides ferussacianus*, *Symphynota compressa*, *Symphynota viridis*, *Symphynota costata*, *Alasmidonta marginata*.

These peculiar conditions may be explained by the following assumption: *Quadrula*, with the four gills serving as marsupium, is, in my opinion, the most primitive type of our *Unionidæ*. Next to it stand *Pleurobema* and *Unio*, with only the outer gills serving as marsupium, but with the shell more or less resembling that of *Quadrula*. These forms represent also the most primitive type of the breeding season, which is short, and falls into the warm season. These forms existed already at a time when a uniform warm climate prevailed. At that time, possibly, the breeding season was not so restricted, but at the present time it has become so, since only during a short period of the year these old, primitive conditions prevail (in summer). Forms like *Unio* and *Quadrula* actually go back to mesozoic times.

All other genera are more advanced. The group *Alasmidonta*, *Symphynota*, *Anodontoides*, *Anodonta*, *Strophitus* (which is, according to Sterki, characterized by a peculiar glochidium) resembles in

the marsupium the *Pleurobema-Unio* type, but differs by a general tendency to reduce the hinge teeth. Another group is formed by the rest of the genera, in which the marsupium becomes very highly specialized, more or less restricted to a part of the outer gills, and where true ovisacs are developed. All these more advanced genera originated probably at a time when seasonal changes of climate existed already in our continent—in the tertiary—and the shortening of the warm period in summer possibly induced them to prolong the breeding season, that is to say, to postpone the discharge of the embryos to a more favorable time, namely, till the next spring. This made necessary special adaptations for the carrying of the embryos through the winter, and probably the ovisacs of the most highly developed genera belong to these special adaptations. In certain genera, ovisacs are not at all developed, and in *Strophitus* an independent form (placentæ). This lengthening of the breeding season finally led to the merging of the end of the one of them into the beginning of the next (known only in one of the most highly specialized genera, *Lampsilis*), while in less specialized genera, in *Alasmidonta*, *Symphynota*, *Anodonta*, also in *Ptychobranchus* and some species of *Lampsilis*, an "interim" in midsummer still exists.

I think this is a reasonable interpretation of the different types of breeding season and their development, yet it is proposed here as a mere theory, which should be substantiated by further investigations on the marsupium and the breeding seasons of our *Unionidæ*.

MOLLUSKS FROM AROUND ALBUQUERQUE, NEW MEXICO.

BY H. A. PILSBRY AND J. H. FERRISS.

A considerable amount of work has been done on New Mexican mollusks, and the numerous local lists published would make a good showing for the Territory if compiled into one catalogue. The more recent lists were based upon material collected by Professor T. D. A. Cockerell and his pupils, and by Messrs. Joshua L. and Albert Baily, Ferriss and Pilsbry. The records are to be found in NAUTILUS, ix, p. 116; x, p. 42; xi, p. 69; xii, pp. 76, 131; xiii, pp. 13, 36, 49, 79; xiv, pp. 9, 47, 72, 82, 85; xvi, pp. 57, 69, Mollusca of the Southwestern States, I, II, etc.

In 1906 we collected a few shells in the neighborhood of Albuquerque while waiting for trains.

The immediate environs of Albuquerque are barren of molluscan life. Only along the Rio Grande the drift débris affords small shells, the land forms probably washed down from the Sandia mountains, which rise north of the city. A low ridge of black volcanic rock frowning on the western horizon proved to be not worth the excursion. We found only a few *Pupoides marginatus* there. The nearer slopes of the Sandia mountains are also barren. A few small species were found in the canyon beyond the Agricultural College. A much richer fauna no doubt inhabits the higher slopes northward. Miss Maud Ellis found twelve species in Las Huartus canyon, at 8000–9000 feet elevation (NAUTILUS, xiv, 85).

The following forms were taken:

Helicodiscus eigenmanni arizonensis P. & F. Rio Grande drift; Sandia Mts.

Vitrea indentata umbilicata Ckll. Sandia Mts.

Zonitoides arborea (Say). Sandia Mts.; Rio Grande drift débris.

Zonitoides minuscula (Binn.). Sandia Mts.; Rio Grande drift débris.

Euconulus fulvus (Müll.). Sandia Mts.

Vallonia cyclophorella Anc.. Rio Grande drift débris.

Cochlicopa lubrica (Müll.). Sandia Mts.

Pupoides marginatus (Say). Rio Grande drift débris; volcanic ridge about 5 miles west of Albuquerque.

Pupoides hordaceus (Gabb). Rio Grande drift.

Pupilla blandi Morse. Rio Grande drift.

Bifidaria procera (Gld.). Rio Grande drift.

Bifidaria procera cristata P. & V. Rio Grande drift.

Bifidaria pellucida hordeacella (Pils.). Rio Grande drift.

Bifidaria armifera (Say). Rio Grande drift.

Vertigo ovata Say. Rio Grande drift.

Lymnæa bulimoides cockerelli P. & F. Rio Grande drift.

Planorbis trivolvis Say. Rio Grande drift.

Planorbis parvus Say. Rio Grande drift.

Valvata (*humeralis* Say?), one broken specimen. Rio Grande drift.

FOSSIL AND LIVING SHELLS FOUND IN LITTLE MUD LAKE, WESTMANLAND, AROOSTOOK COUNTY, MAINE.

BY OLOF O. NYLANDER.

This small lake is located in the forest near the south line of Westmanland Plantation, and is the headwater of Salmon Brook. This little lake contains some interesting shells not found in the county before. The deposit of dead shells (marl) is many feet in thickness, and is chiefly composed of *Pisidia.*

The living shells are extremely rare in the lake, and those collected came from small spring brooks at the north end of the lake. Dr. V. Sterki has kindly examined all the *Pisidia.* I do not know what the amateur collectors would do with these miserable little shells without his assistance. The fossils collected are as follows:

Lymnæa desidiosa Say. Common.

Planorbis campanulatus Say. Common.

Planorbis bicarinatus Say. A few young shells.

Planorbis hirsutus Gld. One specimen.

Planorbis parvus Say. Abundant.

Ancylus parallelus Hald. One specimen.

Valvata sp.? A variable species; some are nearly flat, others have the apex extremely elevated, a large percentage are decollate and the whorls are sometimes dislocated near the apex.

Mr. Bryant Walker has examined specimens and states: "They are extremely curious * * * I have never seen any like them before. They are no doubt a form of *V. sincera* Say."

Dr. W. H. Dall gives me the following information: "They are exactly like the depauperate form of *V. lewisii* Currier. * * * The distortions are familiar to me as found in marl deposits, the water becoming too much mineralized for the mollusks."

I made special efforts to obtain living specimens of this *Valvata* during the two trips to the lake, but not one could be found.

Anodonta fragilis Lam. Fragments.

Sphærium sulcatum Lam. A few valves.

Sphærium rhomboideum Say. Common.

Musculium sp.? probably *securis* Prime. Small.

Pisidium variabile Prime.

" *compressum* Prime.

" *affine* Sterki.

Pisidium mainense Sterki.
" *ventricosum* Prime.
" *costatum* Sterki.
" *medianum* var. *minutum* Sterki.
" *contortum* Prime.
" *triangulare* Sterki.
" *tenuissimum* Sterki.
" *splendidulum* Sterki.
" *splendidulum*, a new var.—Sterki.
" *abditum?* or closely related to that species.

The following living shells were collected:

Planorbis trivolvis Say. Two specimens.

Planorbis parvus Say. Three specimens.

Anodonta fragilis Lam. One specimen.

Musculium sp.? A small form, probably a new species.

Pisidium variabile Prime.
" *ventricosum* Prime.
" *subrotundum* Sterki.
" *mainense* Sterki.
" *medianum* var. *minutum* Sterki.
" *splendidulum* Sterki.
" *splendidulum*, a new variety.—Sterki.

As additions to the Aroostook county shells, I might mention *Pisidium punctum* var. *simplex* Sterki. Dead water Caribou stream, Woodland. Rare and new to the county.

Pisidium milium Hald. is common in Gelot's Lake, New Sweden. *Caribou, Me.*

REMARKS ON THE SUBFAMILIES HYRIINÆ AND UNIONINÆ.

BY L. S. FRIERSON.

A few facts having important bearing on the classification of the *Naiades*, having come to notice, are herewith given to the readers of NAUTILUS.

Two species of the genus *Pseudodon* were obtained from Sowerby and Fulton, showing beak sculpture. *P. vondembuschiana* Lea has a somewhat doubly looped sculpture. The anterior loops curve upwards; the posterior are straighter, sloping backwards and downwards.

P. walpolei has a sculpture much like that of the *Cristarias*, being heavy bars, more or less parallel with the growth-lines.

The important fact revealed by these specimens shows that the genus must be moved from the subfamily *Hyriinæ* and placed in the subfamily *Unioninæ*.

Two species of *Parreysia* (*P. corrugata*, and *P. wynegungaensis*) were received (numerous specimens) bearing eggs in all four gills, as in *Quadrula*. That these shells would be found bearing ova in all four gills was prophesied as being probable by Mr. Simpson (Synopsis, page 508).

The important bearing of this fact is that it proves that *beak sculpture and manner of carrying ova in the gills are not correlated.*

In this connection Mr. C. T. Simpson wrote (in a letter) several years ago that gravid animals of the group of *Unio* (*Nodularia*) *caffer* Krauss proved to carry eggs in their *outer gills*, and thus necessitated the moving of this group from the subfamily *Hyriinæ*, genus *Nodularia*, to the subfamily *Unioninæ*, genus *Unio*.

But in the light of further knowledge we see that our definition of the subfamily *Hyriinæ* (as differentiated from *Unioninæ*) must be amended. We must choose between beak sculpture ("radial *versus* concentric") or marsupial characters ("Exobranchiæ *versus* Endobranchiæ") in our definitions.

The judgment of the writer would be to drop the *marsupial* feature and adhere to the beak sculpture, thus giving for our definition of the subfamily *Unioninæ:* "Essentially concentric beak sculpture," and for *Hyriinæ:* "Essentially radial beak sculpture." Thus amended, the group of *Nodularia caffer* Krauss remains undisturbed, as originally located by Mr. Simpson.

DESCRIPTIONS OF TWO NEW AMERICAN PUPIDÆ.

BY V. STERKI.

VERTIGO NYLANDERI n. sp.

Shell perforated, oblong, with a rather acute apex, of deep horn color, pellucid; whorls $4\frac{1}{2}$–5, quite convex, with a deep suture, with sub-regular, crowded striæ (except the embryonal), the last occupying about one-half of the altitude, gradually narrowed towards the aperture, which is small; peristome slightly everted, margin not thickened; palatal wall with an indentation barely above its middle, forming a well-marked sinus and sinulus; behind it a trace of a crest, and behind that a long, deep furrow-like impression over the palatal

folds, ascending obliquely from near the base; no callus within; lamellæ and plicæ 6; parietal rather long and curved; parallel with it is a thin, lamelliform angular; columellar and inferior columellar rather small, short, the latter near the base; palatals long, the lower deep-seated, ending close to the beginning of the upper, one appearing to be a continuation of the other.

Alt. 1.6, diam. 0.9 mm.

Soft parts not seen.

Woodland, Aroostook county, Maine, collected in 1896 by Mr. Olof O. Nylander, in whose honor the species is named. I have two specimens on hand, the types (No. 1075 of my collection of North American *Pupidæ*); a few more are in the collection of Mr. Nylander. Ever since '96 the form was regarded as distinct, but not published. The two specimens are alike, mature and perfect, and cannot be deformed ones of some other species. In appearance and surface striæ they are somewhat like *V. gouldii* Binn., but otherwise the shell is quite different. In its shape, with the narrowed last whorl, it somewhat resembles *V. oscariana* St., but the lamellæ and plicæ are very different.

Bifidaria clappi n. sp.

Shell glossy, colorless to milky-whitish, perforate, cylindrical in the lower 3–4 whorls, conical or subconical above, with a rather acute apex; whorls $6\frac{1}{2}$–$7\frac{1}{2}$, the upper ones rather narrow, the lower ones broader and less convex, the last moderately large, ascending at the aperture, somewhat narrow but rounded at the base, slightly flattened over the palate; surface shining, with slight irregular to subregular striæ; aperture nearly oval, margins approximate; peristome everted, not thickened, but there is a slight to rather strong white callus in the palate; lamellæ and plicæ: parieto-angular distinctly complex, rather long, moderately elevated, connecting with the peristome near its outer upper terminus (much as in *B. armifera*), the spur[1] of the parietal moderately large; columellar axial spiral, with the lower end nearer the aperture, thicker and rather abrupt, or somewhat bifurcate; "basal" (inferior columellar) slight or wanting;

[1] In *B. armifera* and *clappi*, near the inner end of the parietal lam., there is a process, or "spur," outward, that is, towards the periphery, at nearly right angles, smaller or larger, generally visible in front view. So far it has been seen in no other species; but in *B. contracta* there is a protracted, curved part, lower than the rest of the lam., and not visible in front view.

upper and lower palatals regular, an interpalatal in many specimens; suprapalatal wanting or quite small.

Alt. 3.5–4 (rarely 3.2–3.4), diam. 1.9–2.1 mm.; aperture alt. 1.5, diam. 1.2 mm.

Soft parts, seen only from one dried Alabama specimen, soaked, very dark from copious, deep brown pigment. Jaw amber-colored, strongly curved, rather broad, rounded at the ends, its surface with numerous radial rib-striæ; the line of the attachment of the tenaculum strong.

Radula with 78 transverse rows of 27 (or 29) teeth, r + 6 + 7 (8); rachidian rather narrow, with a short mesodont and very small ectodonts (barely visible); laterals bicuspid, with the mesodont as long as the plate, the ectodont about one-third as long; the outer posterior angle of the plate raised, cusp-like; seventh and eighth with the ectodont split in two, somewhat intermediate or "transition" teeth; marginals (9–13) serrate, with the mesodont rather long, thin; the fourteenth a barely visible irregular transverse bar, or wanting. As this is from a single specimen, there may be some variation. Other parts could not be examined.

Habitat: Knoxville (various localities); eastern Tenn.; Fayetteville and Columbia, Tennessee; Gurley and Huntsville, Alabama; Grand Rapids, Michigan; "Ottawa, Illinois."?

The species shows little variation, except in altitude, with nearly the same diameter, and such as are noted in the description. There is no tendency towards having the peristome continuous. The types are from Knoxville, Tenn., but almost any good specimen seen from anywhere might be taken for a type.

B. clappi is remarkable for its resemblance to some forms of *B. armifera* Say, for a variety of which it has been taken. Yet it is quite distinct. Of over 150 specimens carefully compared with more than 1500 *armifera* not one was found doubtful or intermediate. The most tangible difference is in the shape of the columellar lamella. The shell averages somewhat smaller, the apex is more acute, the surface striæ are finer and slighter, the lower palatal plica is always

[1] *B. armifera* shows considerable variation with respect to size and shape, and in connection with it, in the shape of the columellar and lower palatal. These differences mark two main forms, varieties at least, the shell of one of them being more cylindrical and more or less resembling *clappi*, but the columellar (and lower palatal) are always different.

regular.[1] When one is once familiar with the species it is easily recognized. There is no doubt that specimens are in various collections as, and mixed with, *armifera*, and all such lots should be revised.

Specimens, as "*Pupa armifera*," were received in 1886–92 from the late Mrs. Geo. Andrews, collected at Knoxville, Tenn., at various places, marked: "Garden," "The Thicket," "under stones," aggregating 58 *armifera*, 51 *clappi*. In a lot of 32 from drift on the Duck river, Columbia, Tenn., sent by Prof. B. Shimek in 1892, 18 were *armifera* and 14 *clappi;* 5 specimens, of the latter only, from "Columbia, Tenn.," were received from Mr. A. A. Hinkley in 1887. Lately Mr. Geo. H. Clapp was kind enough to send me all his *armifera* for inspection; among them was a lot from "Eastern Tennessee," all *clappi;* one from Gurley, Ala., the same; and one from Huntsville, Ala., with 36 *armifera* and 1 *clappi*. The latter two were collected by Mr. Herbert H. Smith. Mr. Bryant Walker also kindly sent me his whole *armifera* material, 37 lots. Among them were *clappi* from Fayetteville, Tenn., and Huntsville, Ala., and, much to my surprise, from Grand Rapids, Mich. Also in a lot from "Ottawa, Ill.,"? which I owe to Mr. F. C. Baker, both species were represented. It seems then that the distribution of *B. clappi* is not only southeastern, as had been supposed, and it may be found in other parts of the country also.

I take pleasure in naming the species in honor of Mr. Geo. H. Clapp.

Strange Shells. One specimen: Umbilicate, cylindrical-turriculate; whorls $6\frac{2}{3}$, moderately convex, the last occupying nearly one-half of the altitude; aperture higher than wide, somewhat like that of *Cionella lubrica* except for the columellar part; peristome straight, thin and sharp; no trace of lamellæ and plicæ; colorless to pale horn; shell thin, translucent; surface with fine, irregular striæ; alt. 4, diam. 2 mm.; aperture alt. 1.5, diam. 1 mm.; umbilicus round, of about 0.5 mm. diam., and pervious into the preceding whorls. From Rose Hill, near Buffalo, N. Y., collected and sent by Miss E. L. Letson in a lot of *Bifid. armifera* Say, var. What is it? If it came from a foreign country, or even from some unexplored part of our own continent, one might be tempted to regard it is representing a n. sp., and even a new genus. But in all probability it is a freak, or monstrous specimen of *Bifid. armifera*. This had been written when I received, from Mr. Clapp, a somewhat corresponding

specimen, from Gastonburg, Ala. It was plainly a *B. armifera*, large, especially the last whorl, much larger than the penultimate, evidently overgrown, with a very small and slight parietal lam. A specimen, corresponding especially with the first-mentioned, of *Bifid. corticaria*, from Jackson county, Ala., was received years ago from Mr. H. E. Sargent. 3.1 mm. high; peristome straight and thin; aperture without a trace of lamellæ.

REV. A. B. KENDIG, D. D.

Dr. Amos B. Kendig, one of the best known Methodist clergymen of New England, died January 20, 1909, at Brookline, Mass.

Dr. Kendig was born in Lancaster county, Penna., in 1830, removing to Iowa when a young man. He at first studied law, but changed to the ministry, and was ordained in 1852. In the Civil War he served for a time as chaplain of the 9th Iowa regiment.

In 1875 Dr. Kendig came to Boston and became pastor of the Monument Square M. E. Church in Charlestown. Later he held pastorates in Lynn, Worcester and Boston; then going to Brooklyn, N. Y., East Orange, N. J., and New York City.

Dr. Kendig was known for his energy in all that he undertook. He was a man of devout Christian character, and he brought to his profession the courtesy and the manners of a gentleman of the old school. A man of broad culture and sympathy, he took great interest in scientific matters, and was a member of several learned societies. He took up the study of mineralogy at one time, aad made a large and fine collection of minerals, which he presented to a college in Iowa. Later he made a study of land shells of the world, built up a large and valuable collection, and accumulated a library. In 1903 he decided to give up the study of shells, his collection going to the Franklin and Marshall College, Lancaster, Pennsylvania. Dr. Kendig had many warm friends among conchologists. He is survived by two daughters, Mrs. George F. Kellogg and Mrs. Silas Peirce.

SUPPLEMENTARY NOTES ON THE BREEDING SEASONS OF THE UNIONIDÆ.

BY CHAS. H. CONNER.

Dr. A. E. Ortmann's article, relative to the breeding seasons of the *Unionidæ*, will doubtless be received as an interesting and valuable contribution to the subject, and in order to extend its usefulness, so far as my limited ability will permit, I beg to present a condensed report of my observations, made from 1905 to 1908 inclusive. I, too, have noticed some apparent variations in the breeding periods of individuals, as also in the species, in different years. Possibly this

difference may be due more or less to difference in the seasons (weather) from year to year.

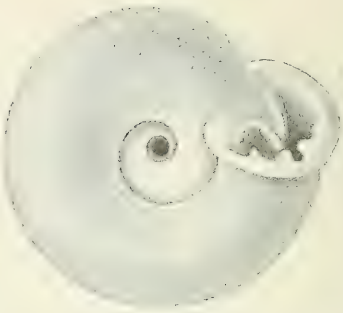
The facts already obtained have an important bearing on legislative action already taken or contemplated for the protection and preservation of our fresh-water mussels. Unlike the song and game birds and the mammals, no close season will serve to protect all of the species. The taking of all clams under the fully adult size must be prohibited to prevent their extermination by pearl-hunters and button manufacturers.

TABLE SHOWING GRAVID PERIODS OF THE UNIONIDÆ.

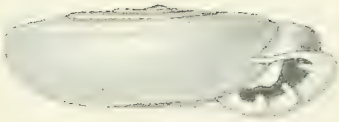
The letter *g* indicates gravid individuals, *n* denoting that none were found gravid, *gn* that some females examined were gravid, others not gravid, either among specimens taken at the same time or in the same month in different years.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Anodonta cataracta Say. . . .	g	g	g	gn	gn	n	n	n	g	g	g	g
Anodonta implicata Say. . . .	g		g	g	g	n	n	n	g	g	g	g
Anodonta undulata Say. . . .			g	n	n							g
Alasmidonta undulata Say. . .								g				
Alasmidonta varicosa Lamarck.					g	n						
Lampsilis cariosus Say		g	g	n	g	g	g		g	g		
Lampsilis ochraceus Say . . .				g	g	g						
Lampsilis radiatus Gmélin . .		g	g	g	g	g	g	g	g	g	g	g
Lampsilis ventricosus Barnes. .									g			
Lampsilis ligamentinus Lamarck.								g	g			
Margaritana margaritifera L. .	n					g		g			n	
Quadrula multiplicata.											g	
Quadrula perplicata Conrad. .											n	
Quadrula trapezoides Lea . . .											n	
Strophitus edentulus Say. . . .								g				
Symphynota viridis Conrad . .								g				
Unio complanatus Solander . .	n		n	gn	g	g	g	gn	n	n	n	n
Unio heterodon Lea.		g										
Unio nasutus Say	g	g	g	g	g	g	gn	g	g	g	g	g
Unio northamptonensis Lea.	approximately as *U. complanatus*.											
Unio occidens Lea									g			
Unio rectus Lamarck.								g				
Anodonta footiana Lea								g				
Anodonta subcylindraceus Lea .								g				
Lampsilis superiorensis Marsh .								g				

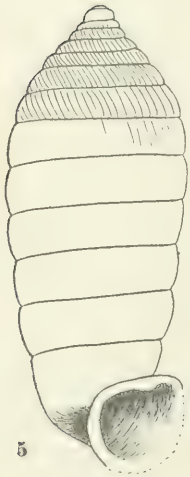
1



2



3



5

6

7

1, 2, 3, ASHMUNELLA KOCHII CLAPP. 4, BIFIDARIA CLAPPI STERKI. 5, 6, HOLOSPIRA BARTSCHI P. & C. 7, BIFIDARIA BILAMELLATA STERKI & CLAPP.

The Nautilus.

Vol. XXII. MARCH, 1909. No. 11.

PISIDIUM IN MASSACHUSETTS.

BY REV. HENRY W. WINKLEY.

During the past two summers the writer has had opportunity to collect in various places in Massachusetts, and *Pisidium* has yielded some good series. The species have just been determined by Dr. Sterki, with the following results:

Dalton, in the Berkshire Hills—a brief visit in early spring—yielded *compressum* and *abditum*.

Newton, Upper Falls, gave at one visit *variabile*, *aequilaterale*, *pauperculum*, *affine* and *ferrugineum*.

Woburn, in a small outlet to Horn Pond, had *compressum*, *abditum* and *affine*.

Concord, near the famous battlefield, shows *variabile*, *abditum*, *compressum*.

Wareham is at the head of Buzzards Bay, almost on Cape Cod. It is an important place in cranberry culture. Considerable material was obtained from ditches in the cranberry bogs. The species *variabile* and *abditum* both show local peculiarities; *ferrugineum* also occurs in the bogs. A trout brook in the woods gave excellent sets of *variabile*, with *abditum* quite rare.

The Agawam River at East Wareham is one of the richest collecting grounds I know. *Pisidium* is not abundant, but is peculiar. Dr. Sterki writes of *variabile:* "Rather different from the common form, and representing a variety if found at other places," another form similar yet distinct.

Danvers, my present home, proves an excellent region for this

genus. A few tiny brooks are teeming with fresh-water shells, and the town has the following species: *compressum*, *variabile*, *abditum*, *ventricosum*, *ferrugineum succineum*, *neglectum*, *aequilaterale*, *ferrugineum* and *splendidulum*, "for the first time seen in large numbers from Massachusetts." A few forms not quite settled may show more of interest. A more careful search next summer may yield even more species from this interesting locality.

NOTES ON SHELLS COLLECTED AT BALSAS, GUERRERO, MEXICO, BY MR. WALTER E. KOCH, IN DEC., 1908.

BY H. A. PILSBRY AND GEO. H. CLAPP.

These shells were found in the crevices of the limestone rocks bordering the Rio Balsas, and the ravines leading to it, and about 1000 feet above the river, or at an altitude of 2000–3000 feet. No living shells were seen, and limited time prevented a very thorough search.

EUGLANDINA LIEBMANNI (Pfr.).

The specimens have the more minute sculpture very beautifully developed, agreeing with Strebel's account of the type specimen. There is also a coarser form in some other localities, which seems to be more abundant in collections.

POLYGYRA MATERMONTANA Pils.

A series of eleven specimens shows great variation in size and shape of the umbilicus, and better preserved examples might possibly show the presence of more than one species in the lot. The extremes in size are 7.3 mm. diam. with 5 whorls, and 11 mm. with $5\frac{1}{2}$ whorls.

OXYSTYLA ZONIFERA (Strebel).

Typical examples of this well-marked species.

HOLOSPIRA BARTSCHI n. sp. Pl. viii, figs. 5, 6.

The shell is white, imperforate, oblong, widest at the eighth or ninth whorl, rapidly tapering to the last whorl; terminal cone short, the apex mamillar. Two embryonic whorls smooth, gray, projecting, the first whorl wider than the second; following three whorls

sculptured with slender riblets parted by wider intervals; the riblets then become irregular and weaker; at and below the shoulder they disappear, and the whorls are nearly smooth and flat to the last, which is ribbed, the ribs rather strong but irregular on the last half whorl, which is straightened, tapers to the well-rounded base, and is very shortly produced forward beyond the preceding whorl. The aperture is very shortly piriform, upper margin straightened with a slight callus within near the outer angle; other margins well curved and expanded. Internal axis rather wide throughout, widest above, smooth, its walls slightly concave within each whorl. At the end of the penultimate whorl there is a barely noticeable swelling of the axis, hardly visible in some specimens, and with no superposed callus.

Length 14.8, greatest diam. 5.8 mm.; whorls 14.

Length 15, greatest diam. 5.9 mm.; whorls 14.

Length 18.25, greatest diam. 5.3 mm.; whorls $13\frac{3}{4}$.

The length is estimated, since all of the examples have the peristome more or less broken basally. While very "top-heavy," it is less obese than *H. imbricata* v. Marts., which is strongly ribbed throughout. No other species of similar shape has the same axial structure. In having a large internal pillar, *H. bartschi* resembles *H. fusca* v. Marts. Neither species is a typical *Haplocion*, but they agree with no other of the defined sections of *Holospira*.

This species is named for Mr. Paul Bartsch, author of an excellent paper on *Holospira* and related genera.

HOLOSPIRA GOLDMANI Bartsch.

One example, 13 x 5 mm., agrees well with a cotype of this species, received from the National Museum through the courtesy of Dr. Dall. *H. gealei* H. Ad., of which the internal structure is unknown, may prove to be allied. It is not unlike *goldmani* externally, so far as can be gathered from Adams' inadequate description.

A NEW SPECIES OF PHOLADOMYA.

BY WM. H. DALL.

The figured type of the genus *Pholadomya* Sowerby is the recent *P. candida* Sow., from the island of Tortola in the West Indies, described in 1823. A large number of fossil species are known, but

during the eighty-four years which have elapsed since Sowerby characterized the genus, only one more recent species which can confidently be affirmed to belong to the typical section of the genus has been described. This is the *P. loveni* Jeffreys, 1881. *P. candida* has its hinge composed of a pair of nymphs sustaining the external ligament, and in front of the nymphs a triangular area, directly under the beaks, which supported an internal resilium, some fibers of which still adhere to the specimen in the National Museum. The anterior edge of the resiliifer is raised into a rib-like prominence, which is what in descriptions of the genus is usually referred to as an "obscure tooth." It is not a tooth, but a reinforcement of the pit or chondrophore. Not having a specimen for study in 1895, my description of this hinge from figures (Trans. Wagner Inst., iii, p. 530) is to this extent inaccurate. It is true that Verrill in 1881, and Locard in 1898, have described two bivalves under the names of *Pholadomya arata* and *P. africana* (Fischer MS.), but these do not belong to the typical section of the group and may belong in a wholly distinct genus. They are wedge-shaped, truncate shells with the chondrophore obsolete, and having an aspect which leads one to doubt whether the resilium was developed at all in either of them. Their soft parts are wholly unknown. It is therefore a matter of especial interest that in recent work of the U. S. S. *Albatross* in the N. W. Pacific, Aug. 10, 1906, at station 4904, in 107 fathoms, a right valve of *Pholadomya* was obtained, which I now propose to describe.

PHOLADOMYA PACIFICA n. sp.

Shell resembling an unusually plump specimen of *Mya arenaria* in general form, white, very thin, the beaks near the anterior third; inner layer of the shell pearly; beaks low, slightly prosocoelous; anterior margin of the valve evenly rounded, posterior a little attenuated and with a slight gape but also rounded; hinge-line thin with a short, narrow nymph, the chondrophore also narrow, directed obliquely backward, under and nearly parallel with the nymph; interior polished when fresh, the specimen rather dull, almost concealing the pallial sinus, which is less deep than in *P. candida*. The muscular impressions are obscure, but seem to agree with those of hat species; exterior largely, finely granulose, like many *Thracias*, sculptured with more or less evident lines of growth, and with abo

nine low radial ridges, starting from the beak, near which there are some intercalary ridges which become obsolete about the middle of the disk; both ends of the shell are destitute of radial sculpture for about one-fourth the total length; there is no defined dorsal area, lunule or escutcheon. Length of valve 48; length behind the beak 30; height 34; height of beak above the hinge-line 2.5; (double) diameter 26 mm. The sparse radial sculpture in the middle of the shell is almost exactly like that of *P. candida*, except that in the latter there are obscure nodosities on the ridges and no intercalaries, while both ends have obsolete radial lines. In one specimen of *P. candida* there are eleven ridges. The sculpture of *P. arata* and *africana* is quite different. The base of *P. pacifica* is gently arcuate. The specimen is registered in the U. S. Nat. Mus. as No. 110,456. It may be added that the granulation of the surface in *P. candida* is much less dense and conspicuous.

THE SHOWALTER COLLECTION.

BY HERBERT H. SMITH.

Every student of North American fresh-water shells is familiar with the name of Dr. E. R. Showalter. He collected, probably, three-fourths of the Alabama *Pleuroceratidæ* described by Lea, and not a few of the *Unionidæ;* many of Anthony's species came from him, and he corresponded for years with Lewis, Hartman and other eminent conchologists. Dr. Showalter resided at Uniontown, Perry county, and afterwards at Point Clear, near Mobile, and he made extended excursions to the Cahaba, Coosa and other rivers of the Alabama system. His work, interrupted by the Civil War, was taken up again about 1867, though not apparently with the same enthusiasm. Until Aldrich took up the task, Showalter was almost the only man in this rich field, and his specimens are scattered through all our collections.

Few naturalists know that Dr. Showalter had a collection of his own, and fewer still imagine that it is in existence. It had, in fact, a narrow escape from destruction. After Dr. Showalter's death the shells were stored for years under his house at Point Clear. Like

most southern houses, this is supported by corner pillars, the space beneath being open to the winds and often to driving rains. Some of the boxes rotted, specimens fell out and labels decayed; when at length the collection became the property of the Alabama Geological Survey, portions of it had literally to be scooped up with a shovel. The condition was not encouraging, but such things always look worse than they really are. No doubt some specimens and labels were irretrievably lost, but by far the greater part of the collection was saved intact, and for this we must thank the able director of the Geological Survey, Dr. Eugene A. Smith. From the first he was keenly alive to the value of the Showalter shells, but with the means at his disposal he could do no more than preserve them from further harm; this he has done conscientiously. For years the collection has been stored in the State Museum at Tuscaloosa, but it could not be made available to students.

Some months ago Mr. Bryant Walker asked me to examine the Showalter collection and, if possible, catalogue the *Unionidæ*. Dr. Smith placed the shells unreservedly in my hands and forwarded the work by every possibly means; ultimately he asked me to arrange the whole collection, and this I am now doing.

Later on I hope to give a more extended account of this historical collection. It is much richer than I had imagined, and nearly all can be saved to science. For the student of Alabama *Pleuroceratidæ* its importance can hardly be overestimated; species which have been among the rarest in our collections are here represented by hundreds, sometimes thousands, of good specimens, and these, if not exactly cotypes, are at least the lots from which types were taken. Generally speaking, the shells are correctly labeled, far better than *Pleuroceratidæ* in the majority of our cabinets. The *Unionidæ* and land shells are also important. Dr. Showalter had a general collection of no great extent, and this will be useful for educational purposes.

Every naturalist will be glad to know that the Showalter collection can be saved, and that it will soon be housed in the new museum building. The liberal character of Dr. Smith is a sufficient guarantee that the specimens will be available to every true student.

State University, Tuscaloosa, Ala., Feb. 9, 1909.

RECORDS OF MINNESOTA MOLLUSKS.

BY L. E. DANIELS.

The month of July, 1905, I spent at various points in Minnesota, and incidentally did some collecting of mollusca; and since there has been so little published on the mollusca of Minnesota, I contribute my mite.

The following is a complete list of my catch. At Thief River Falls and White Earth Lake I collected several days; at the other localities but a few hours, so that this list cannot be taken as a complete fauna of either locality. At the time of my collecting, the rivers and lakes were very high, which will account for the scarcity of fluviatile species.

In order to shorten the names of the localities I will say that Halma is in Marshall county; Anita and Thief River Falls in Red Lake county; White Earth Lake in Becker county; Lake Harriett, near Minneapolis, in Hennepin county; and Cannon Lake in Rice county.

Polygyra multilineata (Say). Minneapolis.

Circinaria concava (Binn.). Minneapolis.

Vitrona limpida Gld. Thief River Falls.

Vitrea hammonis (Strom.). Thief River Falls, White Earth Lake.

Vitrea binneyana (Morse). Thief River Falls, White Earth Lake.

Euconulus fulvus (Müller). Thief River Falls, White Earth Lake.

Euconulus chersinus polygyratus Pils. Thief River Falls, White Earth Lake, Anita.

Zonitoides arborea (Say). Thief River Falls, White Earth Lake.

Zonitoides minuscula (Binney). Thief River Falls.

Zonitoides milium (Morse). Thief River Falls, White Earth Lake.

Pyramidula alternata (Say). White Earth Lake, Minneapolis.

Pyramidula cronkhitei anthonyi Pilsbry. White Earth Lake, Cannon Lake, Anita.

Helicodiscus parallelus (Say). Thief River Falls, White Earth Lake, Anita.

Punctum pygmæum (Drap.). Thief River Falls.

Succinea retusa Lea. White Earth Lake, *var.* Thief River Falls.

Succinea ovalis Say. Thief River Falls, *var.* Minneapolis.

Succinea avara Say. Thief River Falls, Cannon Lake.

Succinea avara vermeta Say. White Earth Lake.

Strobilops virgo (Pils.). Thief River Falls, White Earth Lake.

Bifidaria contracta (Say). Thief River Falls, White Earth Lake.

Bifidaria pentodon (Say). Thief River Falls.

Bifidaria toppaniana (C. B. Adams). White Earth Lake.

Bifidaria holzingeri Sterki. White Earth Lake.

Cochlicopa lubrica (Müller). Thief River Falls. Also a form which seems to be *C. l. morseana* Doherty.

Vallonia costata (Müller). Thief River Falls, White Earth Lake.

Carychium exile canadense Clapp. Thief River Falls, White Earth Lake.

Lampsilis luteola Lam. Thief River Falls.

Anodonta kennicotti Lea. Thief River Falls.

Unio gibbosus Barnes. Thief River Falls.

Quadrula lachrymosa Lea. Thief River Falls.

Sphærium simile Say. Lake Harriett.

Sphærium occidentale Prime. Thief River Falls.

Musculium jayanum Prime. Thief River Falls.

Pisidium sp. Thief River Falls.

Campeloma subsolidum Anthony. Mississippi River, Minneapolis.

Campeloma rufum Hald. Lake Harriett.

Campeloma milesii Lea. Thief River Falls.

Valvata sincera danielsi Walker. Cannon Lake.

Valvata tricarinata Say. Cannon Lake.

Valvata tricarinata simplex Gld. Cannon Lake.

Amnicola limosa Say. *Var.* Cannon Lake.

Physa ancillaria Say. Lake Harriett.

Physa gyrina Say. Lake Harriett.

Physa gyrina hildrethiana Lea. Thief River Falls.

Physa gyrina oleacea Tryon. White Earth Lake.

Aplexa hypnorum (Linn.). Thief River Falls, Halma.

Lymnæa stagnalis appressa Say. Thief River Falls, White Earth Lake, Halma, Lake Harriett.

Lymnæa stagnalis var. Lake Harriett.

Lymnæa obrussa Say. Thief River Falls, Cannon Lake.

Lymnæa obrussa modicella Say. Thief River Falls.

Lymnæa sterkii Baker. Thief River Falls.

Lymnæa coperata Say. Thief River Falls, Anita.

Lymnæa palustris Müller. Thief River Falls, Cannon Lake, Halma, Anita.

Planorbis bicarinatus Say. Lake Harriett, Cannon Lake.

Planorbis trivolvis Say. Thief River Falls, Cannon Lake, Halma, Lake Harriett.

Planorbis campanulatus Say. Thief River Falls, White Earth Lake, Cannon Lake, Lake Harriett.

Planorbis hirsutus Gld. Cannon Lake.

Planorbis parvus Say. Thief River Falls, Anita.

Segmentina armigera Say. Thief River Falls.

TWO NEW VARIETIES OF CYPRÆA FROM N. E. QUEENSLAND.

BY H. B. PRESTON.

Among a number of *Cypræa* from N. E. Queensland recently received there occur two varieties, one of *C. xanthodon* Gray and one of *C. miliaris* Gmel., which, though undoubtedly belonging to these species, possess such marked varietal characters as to merit notice. I therefore venture to describe them, as follows:

Cypræa xanthodon Gray, var. *carnicolor*, n. var.

Dorsal surface flesh-colored without bands, indistinctly freckled with pale rusty-red; base white; posterior and median columellar denticles red, anterior columellar denticles white; denticles on lip pure white throughout; thinner and more piriform than the type; the posterior extremity of the outer lip is more produced, while that of the columellar lip is less so than in the typical form; moreover, there is no dark blotch on the columellar anterior extremity of the dorsal surface.

Alt. 24, diam. maj. 14 mm.

Hab.: N. E. Queensland.

The above has all the appearance of a deep-water shell.

Cypræa miliaris Gmel., var. *nivea*, n. var.

Differing from the typical form in having the dorsal surface grayish-white, gradually shading to pure white towards the base,

spotted indistinctly with numerous small white spots; there is scarcely any sign of lateral punctation on the columellar side.

Alt. 35, diam. maj. 22 mm.

Hab.: N. E. Queensland.

NOTES.

Pearl-hunting in the Fox River, Illinois.—Pearl-hunting commenced in the Fox river this last summer. One or two pearls were found by accident before. Now several tons of the shells have been taken out, perhaps as much as ten tons. Many of the nearby residents have done some hunting for sport, but two parties made a business of pearl-fishing, and perhaps worked 90 days. They received $1,800 for the pearls taken out. Two pearls were valued at $600 each. Jewelers from New York city wrote to a firm in Aurora, Ill., telling them to buy all the Fox river pearls they could get, as they were of the finest quality. Thus the craze spread late in the fall until, I am told, one could count fifty persons in sight hunting clams. They worked until the law to protect clams during breeding season went into effect.—L. A. Keene, Waterman, Ill.

Planorbis bicarinatus.—In order to complete the records of distribution of *Planorbis bicarinatus*, records, preferably accompanied by specimens, are desired from Newfoundland, Nova Scotia, Florida, Louisiana, Mississippi, South Carolina, South Dakota, Wyoming, Utah, Nevada, Arizona and California. The data obtained will be published in The Nautilus.—Bryant Walker, 205 Moffatt Building, Detroit, Mich.

Dr. W. Hoyle, Director of the Manchester Museum, has been appointed Director of the National Museum of Wales at Cardiff.

PUBLICATIONS RECEIVED.

Pyramidellidæ of New England and Adjacent Region. By Paul Bartsch (Proc. Boston Soc. Nat. Hist., Vol. 34, pp. 67–113, pl. 11–14, 1909). An interesting and valuable paper giving in detail the work done by various authors, followed by descriptions of all the genera, subgenera and species. Under Pyramidella are placed two subgenera—Eulimella and Syrnola. One new species,

P. (*Syrnola?*) *winkleyi*, is described from Branford, Conn. Turbonilla is divided into five subgenera—Ptycheulimella, Chemnitzia, Turbonilla, Strioturbonilla and Pyrgiscus. A new subspecies, *T.* (*Strioturbonilla*) *bushiana abyssicola*, is described from 1290–1537 fathoms off Martha's Vineyard. *T. verrilli*, *vineæ*, *branfordensis*, *buteonis*, *winkleyi*, *senilis*, *sumneri*, *cascoensis*, *whiteavesi* and *edwardensis* of the subgenus Pyrgiscus are described as new; the last two are from Prince Edward Island. *T. mighelsi* is proposed for *T. costulata* Verr. 1873 (*non* Risso 1826). Under Odostomia six subgenera are recognized—Chrysallida, Evalina, Iolaea, Menestho, Odostomia and Liostomia. The following are new: *O.* (*Chrysallida*) *bushiana* and *willisi*, *O.* (*Evalina*) *winkleyi*, *O.* (*Iolaea*) *hendersoni*, *O.* (*Menestho*) *trifida bedequensis* and *bisuturalis ovilensis*. *O. morseana* is proposed in place of *O. sulcata* Verr. 1880 (*non* A. Adams 1860). The *Pyramis striatula* Couthouy forms the type of a new genus, *Couthouyella*. There are excellent figures of nearly all the species.

C. W. J.

Natural History, Organization and Late Development of the Teredinidæ or Ship-worms. By Charles P. Sigerfoos. (Bulletin of the Bureau of Fisheries, xxvii, pp. 193–231, pl. vii–xxi.) *Xylotrya gouldi*, *Teredo dilatata* and *T. navalis* from Beaufort, N. C., have been investigated. *T. navalis* carries the eggs in the gills, but in the other species they are laid free into and fertilized in the water. In one case *T. dilatata* was estimated to produce one hundred million eggs. The egg develops into a typical small bivalve having a swimming organ (velum). Throughout the summer these may be found crawling over wooden structures in search of favorable crevices for attachment. Once attached by a single long byssus thread, the larva loses the velum, scrapes away the surface of the wood with the ventral edges of the shell-valves, and the foot develops into a pestle-shaped organ which assists the shell in burrowing. On the external surface of the valves at the anterior edges is formed the first row of small teeth, which at this and later stages are the mechanical agents by which the animal bores into the wood. This transformation has taken place within two days from the time the larva has settled, and afterwards the animal rapidly becomes an elongate ship-worm. Evidence is given showing that the ship-worm may reach a length of 4 feet and diameter of 1 inch in about one year. The sexes are separate in adult ship-worms, but young individuals of *X. gouldi* are frequently hermaphroditic, in which case the male cells develop first. The anatomy is very fully described and illustrated. This timely paper, a valuable addition to our knowledge of Pelecypod morphology, can be obtained of the Bureau of Fisheries.

H. A. P.

DAVID W. FERGUSON.

The Brooklyn Conchological Club mourns the loss of its esteemed member, Mr. David W. Ferguson, whose death occurred on February 7th, in his 75th year.

Mr. Ferguson began collecting shells in his eighth year, continued up to the time of his death, and became one of the most discriminating collectors in New York city. His knowledge of shells and ability to recall names was remarkable. In his early life he enjoyed the friendship of Bland and the elder Sowerby, and also of Dr. Jay, Stuart, Steward, Constable and all the collectors in New York of the last half of the 19th century. One of his most intimate friends in later years was the late Sloman Rous, who described several unusual species in his collection in THE NAUTILUS some time ago. Mr. G. B. Sowerby named a large white cone, *Conus fergusonii*, which Mr. Ferguson had sent him for identification. It is a fine and distinct species.

Mr. Ferguson was also a collector of Indian relics, and at the time of his death possessed a very large collection, all local to Long Island and nearby New Jersey. The region where these were obtained is now entirely built over, rendering the collection quite valuable at the present time.

DR. LORENZO G. YATES.

We regret to announce the death of Lorenzo Gordin Yates, of Santa Barbara, California. Born in England, January 8, 1837, he came to the United States in 1853. He taught in the public schools of Wisconsin, and studied medicine and dentistry. Later, Dr. Yates was on the staff of the Whitney Geological Survey of California. He was especially interested in conchology, mineralogy and botany, and published numerous papers on various zoological and botanical subjects. His principal papers relating to conchology are: "The Mollusca of Santa Barbara County, California," and "New Shells from the Santa Barbara Channel" (Bull. No. 2, Santa Barbara Soc. Nat. Hist., 1890). A new variety of *Helix carpenteri* from southern California (NAUTILUS, vol. iv, pp. 51, 54, 1890), and other notes. He was a fellow of the Linnæan Society of London, member of the Southern California Academy of Sciences, of the Geological Society of America, etc.

THE NAUTILUS.

VOL. XXII. APRIL, 1909. No. 12.

SOME NOTES ON CYPRÆA OF THE PACIFIC COAST.

BY WILLIAM HEALEY DALL.

In 1906–07 Senor Don Joaquin Gonzales Hidalgo published in the Memorias of the Real Academia de Ciencias, Madrid, a useful review of a monographic character, without figures, on the genus *Cypræa*, in which the author includes *Trivia*.

In looking over the species of the west coast of America, and referring to the above-mentioned paper, some questions were raised in my mind, leading to the following notes being recorded.

CYPRÆA EXANTHEMA L. and var. *cervinetta* Kiener. Both the typical form and the variety are found on both sides of the Isthmus of Panama, and no constant differences seem to exist between Atlantic and Pacific specimens, when a sufficiently large series is compared.

CYPRÆA ROBERTSI Hidalgo, 1906. This name is proposed for the well-known *C. punctulata* Gray, 1824; not of Gmelin 1791.

CYPRÆA ANNETTÆ Dall, n. nom. The name *C. sowerbyi* applied by Kiener in 1845, to a well-known West American species, is pre-occupied by Anton (1839) and Gray (1832). Kiener figured a worn specimen under the name of *C. ferruginosa*, a name which had also been used by Gmelin, 1791, for another species. Sowerby in the Conchological Illustrations (1837) referred the *C. sowerbyi* Kiener, to the *C. zonata* Lamarck, 1810; but the latter, though allied, is distinct and comes from the African coast. I may note that the *C. zonata* of Lamarck and Sowerby (after Chemnitz) had

already been named *C. zonaria* by Gmelin (1791). Our shell being nameless, I propose to call it *C. annettae.*

Cypræa caput-draconis Melvill, lives on the reefs at Easter Island and the locality "Hong Kong" is probably erroneous.

Cypræa mexicana Stearns, is omitted by Hidalgo.

Trivia californiana Gray, (1828) was inaccurately monographed by Reeve under the name of *T. californica;* which, having been inadvertently adopted in Carpenter's British Association reports, has been more or less commonly in use ever since.

Trivia costispunctata Gaskoin, 1870, reported from California, if correctly located, is probably only a mutation of *T. radians* Lamarck.

Trivia solandri Gray, and Cypræa spadicea Swainson, are reported from Vancouver Island by Hidalgo, but his authority was doubtless inaccurate, as neither species is known north of latitude 34° 30′ N., and even *T. californiana* is not yet reported north of Bodega Bay in latitude 38° 15′.

It is much to be desired that Californian naturalists will determine from the living animals whether the important differences stated to exist between *Trivia* and *Cypræa* are really as stated; since, if confirmed, the two genera can hardly be retained in the same family.

Erato is not included in Hidalgo's lists, though so closely related to *Trivia;* but I may add that since describing *E. albescens* in 1905 (Nautilus, xviii, p. 124) the details of the station have come to hand and it seems that the type specimen was dredged in 30–41 fathoms, sand, off the western Santa Barbara Islands, California.

BIFIDARIA BILAMELLATA STERKI AND CLAPP, N. SP.

BY V. STERKI.

Shell small, slender, cylindrical or slightly attenuated above, with an obtusish apex, perforate; whorls $5\frac{1}{2}$, subequal, the apical ones comparatively large; colorless to pale or reddish-horn,[1] transparent; surface shining, with very fine, crowded, subregular striæ, on the apex microscopically rugulose; the last whorl ascending above, somewhat flattened at the base close to the aperture, keel-like further

[1] So far as can be seen from drift specimens.

back, somewhat flattened over the palate, with a slight to strong, not sharp, crest behind the margin, with two spiral impressions, one over the lower palatal and another near the base; aperture broadly elliptical to almost circular, peristome continuous or its ends closely approximate and connected by a raised callus, well everted, with a slight to rather strong lip thickening; lamellæ and plicæ, parietal and angular, well differentiated, connected, large, the angular connecting with the peristome; columellar complex, with a lower axial and an upper horizontal part, "basal" a short, transverse lamella, rather abrupt; lower palatal far remote from the margin, but visible in front view, rather long, lamellar, thin, upper palatal somewhat less deep-seated, close to the lower, somewhat oblique, shorter.

Alt. 2–2.4, average 2.2, diam. 0.9 mm.; aperture alt. 0.8 mm. Soft parts not seen.

Habitat: Foothills of Plumosa Range, about 8 miles east of Quartzsite, Yuma county, Arizona, in drift, in company with *B. hordeacella* Pils. and *B. tuba intuscostata* Clapp, discovered by Mr. Geo. H. Clapp, who states that the ratio of *bilamellata* and *hordeacella*, in the drift, was almost exactly 1:16. Large numbers of both species were found.

B. bilamellata is very distinct and different from all other *Bifidaria*. At first sight it might be taken for *hordeacella* for its size and shape, but a glance at the aperture is sufficient to recognize it, and also the posterior aspect is different. With respect to the peristome it approaches *B. ashmuni*; the parieto-angular lamella is of the same formation, and the palatal plicæ are similar but not so deep-seated; the "basal" is the same as in *B. dalliana*. The n. sp. is very interesting by the combination of features of apparently widely different species, and appears to be intermediate between two groups.

Explanation of Plate VIII.

Figs. 1, 2, 3. *Ashmunella kochi* Clapp. Type, No. 5765, coll. G. H. Clapp. Description on p. 77.

Fig. 4. *Bifidaria clappi* Sterki. Cotype, Knoxville, Tenn., No. 98279, A. N. S. P. Description on p. 108.

Figs. 5, 6. *Holospira bartschi* P. & C. Two cotypes, coll. A. N. S. P. and G. H. Clapp. Description on p. 114.

Fig. 7. *Bifidaria bilamellata* Sterki & Clapp. Front view of a cotype, No. 98268, A. N. S. P. Description on p. 126.

A SICILIAN COLLECTION.

BY MAXWELL SMITH.

During February and March, 1908, it was my good fortune to spend nearly fifty days on the island of Sicily, and I improved every opportunity which presented itself for mollusk hunting.

Soon after my arrival in Palermo I called upon the Marquis de Monterosato, and obtained from him much valuable information in regard to localities of Sicilian shells. I also viewed his unrivaled collection of Mediterranean shells, which is especially rich in Sicilian species.

After a few weeks in Palermo the following towns were visited in the order named—Girgenti, Siracuse, Taormina and Messina. Excursions were made from each, but at no time were shells taken more than twelve miles from the sea. From the above will be noticed that the northern, southern and eastern coasts were visited; but the interior and western mountains were untouched. The mountains in the west are exceedingly rich in peculiar species, including the most striking of the latticed *Clausilia*. Each mountain and plain on the island contains its own species or group of species.

Monte Pellegrino, above Palermo, supports a rich snail fauna. The mountain is largely composed of perforated limestone, in the recesses of which a large proportion of the land mollusca live. At the base of Pellegrino in the grass live *Helix hamilcaris* Kobelt. Under stones at the base of the cliffs *Ferussacia folliculus* Gron. Half way up the trail *Helix mazzulli* Jan. and *Helix sicana* Fer. first appear and extend nearly to the summit. Within a hundred feet of the summit *Clausilia grohmanniana* Phil., which was rare below, I found in comparative abundance. Near the signal station on the top *Helix macrostoma* Muhlf., one of the few Sicilian *Campylæas*, was discovered in crevices of the rock. Thus these species apparently prefer various elevations above the sea.

The most remunerative season for terrestrial mollusks in Sicily is during November and December, when the rainy season is usually at its height. At this time every wall is said to teem with shell life. But as I found at Girgenti even the dry season is not unpopular with land mollusca. On the first limb of a single almond tree I counted no less than two hundred and fifty specimens of *Helix*. The opercu-

lates though avoid the direct rays of the sun, living under boulders among the ruins. Siracusan land shells adapt themselves to the dry surroundings by living at the edge of the cliffs overhanging the sea.

Upon reaching Taormina and the base of Etna, I was surprised to find the terrestrial mollusca reduced to a minority. The country here reaches the wildest form, deep crevices and small canyons intersect the mountains and the vegetation is luxurious in early spring. The scarcity of land mollusca is accounted for in the prevalence of lava instead of limestone formations, which are so characteristic of the rest of Sicily.

In the vicinity of Taormina a few small permanent streams were explored. In these, under stones, in swiftly running water, two species of *Ancylus* were collected. The fresh-water genera are not well represented on the island; but near Siracuse the Anapo, a small permanent river, supports a few peculiar species. Many of the Sicilian streams after heavy rains are raging torrents, which, under normal conditions, run underground or in the dry season cease. The absence of mud is also unfavorable for molluscan life. The Anapo rises in a pool of considerable depth, is uniform in width throughout, and after many windings empties into the Bay of Siracuse a few miles below its source. Its banks are lined with papyrus, on the roots of which *Amnicola*, *Bithinia* and other small genera live. Of the lakes in the south I visited none, partly because of their inaccessible location, but particularly on account of their unhealthiness The fauna of each is in the main peculiar, if we include extreme variations.

Romagnala, a small town near Palermo, was found an excellent station for marine species. Facing the open sea, the shore combines sand and algae-covered rocks. Over sixty species were secured in a few hours after a storm, the small species in fresh condition and the larger often containing the animal. Two days later the sand had covered the rocks, and it was with difficulty that ten species were secured. At Siracuse the bay yielded a few marine, and the rocky coast many genera not found at Palermo. *Cypræa lurida* L. and *Fusus syracusana* L. are seldom found near shore at Siracuse, but are frequently brought in by the fishermen. The violence of the surf, combined with the absence of drift on the beaches at Taormina, prevented frequent collecting. *Argonauta argo* L. and *Calliostoma conulus* L. occurred, which were not noticed in the north. Being in

close proximity with the Straits of Messina, a number of shells common at Messina were found at Taormina and Giardine.

At Messina there is an excellent market, in which at 5 a. m. each morning a surprising variety of fish are offered for sale. The early start required is amply repaid. The octopus, *Polypus vulgaris* L., is considered as an especial delicacy as food, both in Sicily and Italy.

In preparing the following list I have determined, for condensation, to omit separate annotations. For convenience I have arranged the *Helices* in alphabetical order, excepting *Leucochroa.*

For the identifications I am indebted to Marquis Monterosato, Mr. C. Payton Gwyer, Mr. E. A. Smith, of the British Museum, and for difficult fresh-water species to Mr. Bryant Walker. The Malacological Laboratory, Paris, has also given free use of its valuable library.

Argonauta argo L. Taormina.

Sepia officinalis L. Taormina, Palermo.

Poiretia algira Brug. Taormina, Girgenti.

Daudebardia brevipes Drap. Palermo.

Hyalinia suburbana Mont. Palermo.

Vitrea hydatina Rossm. Palermo.

Leucochroa candidissima Drap. Girgenti.

Helix acuta L., apicina Lam., conica Dr., conoidea Dr., muralis Müll., pisana Müll., squalida Monts. Siracuse.

Helix agrigantina Ad. Girgenti.

Helix andromica Monts. Taormina.

Helix gregaria Ziegl., moesta Parr. Palermo.

Helix aperta Born, hamilcaris Kob., macrostoma, mazzuli Jan., sicana Fér., variabilis Drap., vermiculata Müll. Monte Pellegrino.

Helix florida Ziegl., ingoi Cafici.

Ena pupa Brug. Girgenti, Palermo.

Pupa avenacea Brug., P. philippii, Cantr. Taormina.

Clausilia agrigantina Brug. Girgenti.

Clausilia affinis Ph., C. affinis Ph. var. taurominica Monts. Taormina.

Clausilia familiaris Monts., C. grohmanniana Phil. Monte Pelligrino.

Clausilia septemplicata Phil. Monreale.

Clausilia syracusana Phil. Siracuse.

Rumina decollata Linn. Well distributed.

Ferussacia folliculus Gron. Monte Pelligrino.

Ferussacia vescoi Bgt. Girgenti.
Succinea megalonyxia Bourg. Siracuse.
Succinea pfeifferi Ross. Palermo.
Alexia myosotis Drap. Siracuse.
Ancylus costulatus Kust. Sigone River near Taormina.
Ancylus striatus Q. & G. Above Letojanni near Taormina.
Lymnæa benoiti Bourg., L. palustris Müll. var. anapensis Monts. Anapo, Siracuse.
Lymnæa truncatula Müll. Palermo.
Planorbis cristatus L. Mondello near Palermo.
Planorbis subangulatus Phil. Siracuse.
Physa cyanea Pirajno. Anapo, Siracuse.
Gadinia garnoti Payr. Romagnola.
Actaeon tornatilis L. Bay of Siracuse.
Bulla striata Brug. Romagnola.
Haminea navicula globosa Jeff. Siracuse.
Philine aperta L. Siracuse.
Conus mediterranea Hw. Siracuse, Romagnola.
Mangilia attenuata Monts. Romagnola.
Marginella miliaria L. Romagnola.
Marginella philippii Monts. Siracuse.
Mitra ebenus Lamk. Romagnola, Siracuse.
Fusus pulchellus Phil. Romagnola, Siracuse.
Fusus syracusanus L. Siracuse.
Latirus lignarius L. Siracuse.
Tritonidea orbignyi Payr. Romagnola.
Euthria cornea L. Romagnola.
Nassa cornicula Oliv. Romagnola.
Nassa costulata Ren. var. flavida Monts. Romagnola.
Nassa cuvieri Payr. Romagnola.
Nassa reticulata Lamk. var. nitida Jeff. Siracuse.
Cyclonassa neritea L. Siracuse.
Columbella rustica L., C. scripta L. Romagnola.
Murex brandaris L. Palermo, Siracuse.
Murex edwardsi Payr., trunculus L. Romagnola, Siracuse.
Murex trunculus L. var. portulana Monts. Palermo.
Typhis tetrapterus Bronn. Romagnola.
Lachesis mamillata Risso. Romagnola.
Purpura haemastoma L. Romagnola.

Lotorium cutaceum L. Palermo.
Lotorium reticulatum Beek. Romagnola.
Cassis sulcosa Brug. Siracuse.
Morio echinophora L. Siracuse.
Cypræa lurida L. Siracuse.
Cypræa pyrum L. Palermo.
Cypræa spurea L. Near Taormina.
Trivia europea Monts., T. pulex Sol. Romagnola.
Chenopus pespelicani L. Messina, Siracuse.
Triforis perversus L. Romagnola.
Cerithium mediterraneum Desh. Romagnola.
Cerithium mediterranneum Desh. var., C. vulgatum Brug. Siracuse.
Bittium lacteum Phil. Romagnola.
Vermetus subcancellatus Bivon, V. subdentatus. Romagnola.
Turritella communis Risso. Siracuse.
Littorina obtusata L. var. neritoides L. Siracuse.
Rissoa cimex L. var. turrita Monts., R. monodonta Biv., R. subcostulata Schw. Romagnola.
Rissoa venusta Phil. Siracuse.
Rissoina bruguieri Payr. Romagnola.
Amnicola subcarinata Monts. Anapo, Siracuse.
Bithinia anapensis Benoit. Anapo, Siracuse.
Cyclostoma elegans Müll. var. villicum Monts. Monreale, Palermo, Siracuse, Taormina.
Cyclostoma siculum Sowb. = costulatum Ziegl. Girgenti.
Pomatias paladilhianus S. Simon. Monte Pelligrino.
Natica millepunctata Lamk. Romagnola, Tamorina.
Natica josephinæ Risso. Romagnola.
Scala communis Lamk. Romagnola, Siracuse.
Odostomia polita Bivon. Romagnola.
Eulima boscii Payr. Romagnola, Siracuse.
Neritina fluviatilis L. Anapo, Siracuse.
Neritina meridionalis Phil. Siracuse.
Neritina viridis L. Romagnola.
Phasianella pulla L. Romagnola.
Phasianella punctata Mich. Siracuse.
Leptothyra sanguinea L. Siracuse.
Astralium rugosum L. Taormina.
Trochus turbinatus Born. Romagnola.

Clanculus cruciatus L. var. rosea Monts. Siracuse.
Monodonta articulata Lamk. Siracuse.
Gibbula adansoni Payr. Siracuse.
Gibbula divaricata L. Romagnola.
Calliostoma conulus L. Messina, Taormina.
Calliostoma depictum Desh., C. laugieri Payr. Romagnola.
Haliotis lamellosa Lamk. Siracuse, Taormina.
Fissurella gibberula Lamk., F. græca Lamk., F. litoralis Monts., F. neglecta Resh., F. nubecula L. Romagnola.
Emarginula solidula Costa. Taormina.
Patella cærulea L. Messina, Romagnola.
Patella lusitanica Gm. Siracuse.
Ischnochiton polii Phil. Romagnola.
Dentalium novemcostatum Lamk. Romagnola.
Ostrea edulis L. Palermo, Taormina.
Anomia ephippium L. Taormina.
Spondylus gæderopus Lamk. Palermo.
Chlamys multistriatus Poli, C. pes-felis L. Taormina.
Chlamys sulcatus Born. Siracuse.
Chlamys varius L. Palermo.
Lima inflata Chem. Palermo.
Mytilus edulis L. Taormina.
Modiola barbata Lamk. Romagnola.
Arca barbata L., A. lactea L., A. noae L. Romagnola.
Unio requieni Lamk. Anapo, Siracuse.
Cardita calyculata Lamk. Taormina.
Cardium aculeatum L., C. paucicostatum Sowb. Siracuse.
Cardium tuberculatum L. var. Romagnola.
Chama gryphoides L. Romagnola.
Tapes beudanti Payr., T. geographica Gm. Romagnola.
Venus gallina L. Siracuse.
Venerupis iris L. Romagnola.
Donax trunculus L. Romagnola.
Solen vaginoides Lamk. Siracuse.
Mactra corallina L. Mondello.
Lucina lactea L. Messina.
Lucina desmoresti Par. Romagnola.
Tellina tenuis Da Costa. Siracuse.
Gastrana fragilis L. Romagnola.
Solemya mediterranea Lamk. Romagnola.

DREDGING OFF SAN DIEGO, CALIFORNIA.

BY C. W. GRIPP.

During the summer of 1908 the writer made a dredging trip outside of the entrance to San Diego harbor, dredging in from 15 to 60 fathoms of water. The following list includes all the species obtained and also a few deep-water species secured from fishermen. This locality is very rich in molluscan life, especially in smaller forms. Including the *Opisthobranchs* my list of San Diego shells contains over 600 species and varieties. I am greatly indebted to Dr. William H. Dall, Mr. Paul Bartsch and Prof. F. W. Kelsey for assistance in determining doubtful species.

Murex californicus Hds.
" carpenteri Dall.
" festivus Hinds.
" incisus Brod.
" santarosana Dall.[1]
Ocinebra foveolata Hds.
Ocinebra interfossa Cpr.
Ocinebra interfossa muricata Cpr.
Ocinebra interfossa atropurpurea Cpr.
Cuma muricata Hds.
Trophon belcheri Hds.
Trophon triangulatus Cpr.
Fusus kobelti Dall.
Gyrineum californicum Hds.
Chrysodomus aphelus Dall.
Chrysodomus kellettii Fbs.
Nassa cooperi Fbs.
" fossata Gld.
" insculpta Cpr.
" mendica Gld.
" perpinguis Hds.
Mitra lowei Dall.
Mitra maura Swains.
Erato columbella Mke.
Erato vittellina Hds.
Marginella jewettii Cpr.
" pyriformis Cpr.
" regularis Cpr.
" varia Sby.
Olivella biplicata Sby.
Olivella pedroana Conr.
Columbella carinata Hds.
" chrysalloidea Cpr.
" gouldii Cpr.
" guasapata Gld.
" hindsi Rve.
" tuberosa Cpr.
Engina carbonaria Rve.
Amphissa corrugata Rve.
Amphissa versicolor Rve.
Myurella simplex Cpr.
Cancellaria cooperi Gabb.
Cancellaria crawfordiana Dall.
Pleurotoma carpenteriana Gabb.
Pleurotoma perversa Gabb.
Pleurotoma montereyensis Stearns.
Pleurotoma santarosana Dall.
Pleurotoma stearnsiana Raymond.

[1] Six or seven specimens at 17 fathoms.

Pleurotoma tryoniana G abb.[2]
Turris (Surcula) halcyonis Dall.
Drillia empyrosia Dall.
" hemphilli Stearns.
" penicillata Cpr.
Bela grippi Dall n. sp.[3]
Mitromorpha aspera Cpr.
Cythara cranneri Arnold.
Mangelia angulata Cpr.
" fuscoligata Cpr.
" hamata Cpr.
" merita, Gld.
" sculpturata Dall.
" striosa C. B. Ad.
" variegata Cpr.
Conus californicus Hds.
Trivia solandri Gray.
Trivia californica Gray.
Ovula spelta Lam.[4]
Polinices lewisii Gld.
Polinices recluziana Desh.
Lamellaria stearnsiana Dall.
Macromphalina californica Dall.
Crepidula aculeata Gmel.
" adunca Sby.
" dorsata Brod.
Crepidula navicelloides Nutt. In aperture of Polynices.
Crepidula onyx Sby. On Pomaulax undosus.
Capulus californicus Dall. On Pecten diegensis.
Amalthea tumens Cpr.
Scala bellastriata Cpr.
" catalinæ Dall.
" near hemphilli Dall.
" hindsi Cpr.
" lowei Dall.
" retiporosa Cpr.
" sarvinae Dall.
Turritella cooperi Cpr.
Mesalia californica Dall.
Mesalia tennisculpta Cpr.
Vermicularia fewkesi Yates.
Cæcum californicum Dall.
" crebricinctum Cpr.
" magnum Stearns.
" orcutti Dall.
" regulare Cpr.
Eulima bistorta Van.
" micans Cpr.
" rutila Cpr.
" solitaria C. B. Ad.
" thersites Cpr.
Liostraca varians Sby.[5]
Turbonilla castanea Cpr.
" eschscholtzi D. & B.
" kelseyi D. & B.
" laminata Cpr.
" oldroydi D. & B.
" painei D. & B.
" tenuicula Gld.
" torquata Gld.
" tridentata Cpr.
Odostomia americana D. & B.
" amianta D. & B.

---

[2] One young shell in dredge. Specimens 90 mm. in length from fishermen.

[3] Ten specimens at 17 fathoms.

[4] Three large specimens at 18 fathoms, new to the Pacific Coast.

[5] A beautiful little brown shell polished like a *Eulima*, which it resembles. Eight specimens dredged at 18 fathoms, new to the California coast.

Odostomia astricta D. & B.
" avellana Cpr.
" delmontensis Bartsch.
" gouldi Cpr.
" helga D. & B.
" nuciformis Cpr.
" straminea Cpr.
Odostomia straminea grippi D. & B. on Haliotis assimilis Dall.
Odostomia straminea insculpta Cpr.
Odostomia valdezi D. & B.
Odostomia virginalis D. &. B.
Pyramidella conica Cpr.
Lacuna unifasciata Cpr.
Fossarus fenestratus Cpr.
Fossarus obtusus Cpr.
Alabina californica Dall.
Bittium asperum Cpr.
" armillatum Cpr.
" esuriens Cpr.
" interfossa Cpr.
" quadrifilatum Cpr.
Seila assimilis C. B. Ad.
Cerithiopsis metaxæ Chiaje.
Cerithiopsis tuberculata Mont.
Triforis adversa Mont.
Rissoina bakeri D. & B.
Rissoina kelseyi Dall.
Barleeia subtennis Cpr.
Rissoa grippiana Dall.
Rissoa reticulata Cpr.
Liotia acuticostata Cpr.
Liotia fenestrata Cpr.
Phasianella compta Gld.
Phasianella pulloides Cpr.
Eulithidium cyclostoma Cpr.
Eulithidium substriatum Cpr.
Pachypoma inæquale Mart.
Pomaulax undosus Wood.
Chlorostoma aureotinctum Fbs.
Chlorostoma pulligo Mart.
Gibbula parcipicta Cpr.
Gibbula optabilis Cpr.
Leptothyra carpenteri Pils.
Leptothyra bacula Cpr.
Turcica caffea Gabb.
Halistyluspupoides Dall.
Halistylus subpupoides Tryon.
Vitrinella complanata Cpr.
Vitrinella subplana Cpr.
Norrisia norrisii Sby.
Calliostoma gemmulatum Cpr.
Calliostoma gloriosum Dall.
Calliostoma canaliculatum parvum Williamson.
Calliostoma supragranosum Cpr.
Calliostoma tricolor Gabb.
Calliostoma turbinum Dall.
Haliotis assimilis Dall.[6]
Haliotis rufescens Swains.
Fissuridea aspera Esch.
Puncturella cooperi Cpr.
Puncturella cucullata Gld.
Emarginula bella Gabb.
Lepidopleurus (Oldroydia) percrassus Dall.
Chætopleura gemmea Cpr.
Callistochiton crassicostatus Pils.
Ischnochiton clathratus Rve.
Ischnochiton cooperi acutior Cpr.

[6] Four live specimens found on rocks hauled up in the dredge. Of *H. rufescens* I got one specimen attached to lobster trap.

Acteon punctocœlatus Cpr.
Tornatina cerealis Gld.
" culcitella Gld.
" harpa Dall.
" inculta Gld.
" planata Cpr.
Volvula cylindrica Cpr.
Cylichna attonsa Cpr.
Bulla quoyi Auct.
Cadulus quadrifissatus Cpr.
Cadulus nitentior Cpr.
Dentalium neohexagonum Pils.
Dentalium vallicolens Raymond.
Siliqua lucida Conr.
Corbula luteola Cpr.
Corbula luteola rosea Williamson
Periploma discus Stearns
Lyonsia californica Conr.
" inflata Conr.
" nitida Gld.
Mactra dolabriformis Conr.
Spisula hemphillii Dall.
Semele pulchra Sby.
Semele rubropicta Dall.
Cooperella subdiaphana Cpr.
Rochefortia tumida Cpr.
Tellina bodegensis Hds.
" buttoni Dall.
" carpenteri Dall.
" idæ Dall.
" modesta Cpr.
" santarosana Dall.
Venerupis lamellifera Conr.
Psephidea ovalis Dall.
Psephidea salmonea Cpr.
Paphia tenuissima Cpr.
Cardium substriatum Conr.
Cardium quadrigenarium Conr.
Protocardia centifilosa Cpr.
Phacoides annulata Rve.
Phacoides approximatus Dall.
Serridens oblonga Cpr.
Crassinella varians C. B. Ad.
Cardita subquadrata Cpr.
Milneria minima Dall.
Venericardia ventricosa Gld.
Nucula castrensis Hds.
Leda cuneata Hanl.
" hamata Cpr
" taphria Dall.
Arca solida Sby.
Glycymeris intermedia Brod.
Modiolus rectus Conr.
Philobrya setosa Cpr.
Lima dehiscens Conr.
Pecten diegensis Dall.[1]
Pecten giganteus Gray.
Monia macroschisma Desh.
Terebratulina caput-serpentis L.
Terebratulina caput-serpentis unguicula. Cpr. 20 faths.
Terebratalia transversa Sby.
Platidea anomioides Scacchi.
Glottidea albida Hinds.

[1] Several young specimens dredged. Have secured from fishermen several large and beautiful specimens.

NEW MOLLUSKS COLLECTED BY MR. A. A. HINKLEY IN SAN LUIS POTOSI, MEXICO.

BY H. A. PILSBRY.

COELOCENTRUM HINKLEYI, n. sp.

The shell is shortly rimate, imperforate, the lower third or half cylindric, the rest slowly tapering to the truncate summit; rather solid; brown. Sculpture of backwardly arched narrow ribs, much narrower than their intervals except on the last whorl, where they are more slender and closely crowded. There are about 65 ribs on the penultimate whorl. On some of the later whorls the ribs are sometimes weak and rather irregular. The apical breach is closed by a steep, slightly convex plug densely covered with strongly projecting granules. Whorls remaining slightly convex, at least the upper ones have a delicate keel close under the suture; last whorl rounded basally, having a very weak, inconspicuous, spiral basal cord. Last half whorl straightened, produced forward beyond the preceding whorl. The aperture is oblique, rounded ovate; peristome obtuse, narrowly recurved. The internal column is moderately large, its diameter contained 3.7 to 4 times in that of the shell. Within each whorl it is rather strongly obliquely swollen, and typically bears a few oblong granules in place of the obliquely vertical laminæ of typical species of Cœlocentrum.

Length 35, diam. 8.1 mm.; whorls remaining 12.

Length 37, diam. 8 mm.; whorls remaining 13.

Length 35, diam. 8 mm.; whorls remaining 11.

Length 39, diam. 8 mm.; whorls remaining 14.

San Luis Potosi: highest Mt. on south side of river at Mecos Falls, and bluff 3 miles north of San Dieguito.

This is a variable species, represented by many specimens from two localities. In some examples the rather large internal column bears distinct elongated granules; others have low nodes, while still others have whitish lines which project only slightly from the surface of the column.

Five specimens of a series from San Dieguito measure:

Length 46, diam. 8.5 mm.; whorls remaining 18½.

Length 41, diam. 9 mm.; whorls remaining 12½.

Length 38.5, diam. 7.7 mm.; whorls remaining 15½.

Length 36.5, diam. 8.7 mm.; whorls remaining 12½.

Length 32, diam. 8.2 mm.; whorls remaining 10½.

At the Mecos Falls locality there is a small, slender form occurring with the types, having only very slight, hardly noticeable nodes on the spiral swelling of the axis. The aperture is carried forward further than in the typical examples. Two of these measure:

Length 35, diam. 7.1 mm.; whorls remaining 12½.

Length 32.2, diam 7.1 mm.; whorls remaining 12.

Cælocentrum ischnostele, n. sp.

The shell is shortly rimate, imperforate, the lower half cylindric, upper half slowly tapering to the truncate summit; thin; pale brown. The surface has a silky luster, and is densely sculptured with thread-like ribs, which arch backward, and are about as wide as their intervals except on the last whorl, where they are finer and more closely crowded. On the penultimate whorl there are about 90 (88 to 92) ribs. The breach at the summit is closed by a very convex, granulose plug. Remaining whorls 11½ to 14½, slightly convex, having a minute carina below the suture and very close to it. The last whorl is convex and has a scarcely noticeable basal cord; its last half is straightened, and projects shortly (about 1½ mm.) forward. The aperture is oblique, rounded-ovate, the upper margin straightened. Peristome obtuse, narrowly recurved throughout. The internal axis is very slender throughout, weakly sinuous within each whorl, smooth, its diameter contained 8⅓ times in that of the shell. It opens by a minute perforation at the summit.

Length 32, diam. 6.8 mm.; 13½ whorls remaining.

Length 32.8, diam. 6.2 mm.; 14½ whorls remaining.

Length 30, diam. 6.5 mm.; 11½ whorls remaining.

Length 27.8, diam. 6.4 mm.; 12 whorls remaining.

Length 27.8, diam. 6.2 mm.; 11½ whorls remaining.

This form occurred in the same locality with *Streptostyla bartschi*, near Mecos Falls. It stands close to the preceding species, but differs by its much more numerous ribs, the much more slender internal axis, and the last whorl does not run forward so far. It is remarkable for the small size of the internal column.

In a young shell 11 mm. long with 14½ whorls the first 1½ whorls forming the hemispherical summit are perfectly smooth and measure 1½ mm. in diameter. Then very fine very short riblets appear

below the suture, and to the 6th whorl the caliber of the shell decreases slightly. Beyond this the caliber increases slowly, and the riblets gradually become longer, though a smooth band persists along the middle of each whorl as far as about the 16th whorl, after which the ribs are continuous.

The above forms, with others, will be figured in a future report on the shells collected by Mr. Hinkley.

A NEW SPECIES OF LYMNÆA.

BY FRANK C. BAKER.

LYMNÆA HENDERSONI n. sp.

Shell globose, very thin and fragile; periostracum light yellowish or brownish-horn; surface dull; sculpture of fine growth-lines, without spiral lines; whorls $3\frac{1}{2}$, very rapidly increasing in diameter, the body whorl seven-eighths the length of the entire shell, very globose; spire very short, depressed, dome-like, the first two whorls flat and coiled in the same plane so that a profile view shows only two full whorls. Nuclear whorls flat, partly concealed by the volutions of the spire; sutures impressed; aperture round or roundly elliptical; outer lip thin; inner lip broad, triangular, reflected over the columellar region, but leaving a deep, well-marked chink; the inner edge of the inner lip is usually bent downward near the body whorl, partly concealing the umbilical chink; parietal callus thin; axis smooth, hourglass-shaped.

Length 7.00, breadth 5.50; aperture length 4.75, breadth 3.00 mm.

Length 6.25, breadth 5.00; aperture length 4.00, breadth 2.50 mm.

Length 6.75, breadth 5.00; aperture length 4.80, breadth 3.00 mm.

Length 5.50, breadth 4.10; aperture length 4.00, breadth 2.50 mm.

Types: Chicago Academy of Sciences, six specimens, No. 24534; Co-types: University of Colorado, Boulder, Colo.

West of Fort Collins, Laramie county, Colo.

Ecology: Inhabits lagoons and intermittent bodies of waters. Judge Henderson writes of the habitat as follows: "I am informed that there had been no water in the lagoon for many months, probably since last summer or autumn. The ground was cracked to a depth of several inches and the mollusks were found down in the cracks in the mud. Therefore, it seems to be another species capable of æstivating."

Remarks: This species was at first thought to be *Lymnæa sonomaensis* Hemphill, but a comparison with that species shows that the present species differs not only from *sonomaensis*, but from all related species in the form of the spire and aperture. The first two whorls of the spire are coiled in the same plane, producing an abruptly truncated appearance. The inner lip is triangular and not evenly rounded as in *techella* and its varieties, but similar to that of *bulimoides*, from which it differs in its truncated spire. The only form likely to be confounded with *hendersoni* is *sonomaensis*, which differs in the form of the spire and inner lip.

I take great pleasure in dedicating this interesting species to Judge Junius Henderson, of the University of Colorado.

SPHÆRIUM PILSBRYANUM, N. SP.

BY V. STERKI.

Mussel large, high, inequipartite, oblique, well inflated; beaks rather large, rounded, prominent, inclined towards the anterior; upper margin strongly and regularly curved in the adult, less so or nearly straight in young specimens, ventral margin rather well and regularly curved; anterior part of the mussel much smaller than the posterior, its outlines rounded or slightly truncate, posterior rounded or truncate obliquely, the end rather drawn downward, rounded or subangular; surface with rather coarse to medium, sharp, concentric striæ, regular over the beaks, less so over the balance of the valves, and with about six to eight impressed lines of growth, deepest posteriorly, with the interstices somewhat bulging; color chalky-whitish to light or deep gray, in some specimens with alternate zones of light and dark; shell thick; muscle insertions slightly marked, large, not impressed; hinge strong, plate moderately broad, rather long; cardinal teeth small, rather typically to irregularly formed, the posterior of the left valve often wanting or rudimentary; laterals rather large, those of the right valve projecting inward, those of the left only slightly so; anterior short, the left raised cusp-like, the posterior all rather long, not raised to cusps.

Long. 18, alt. 16, diam. 11–12 mm.; average; the largest, 21 mm. long.

Fossil, in pleistocene or possibly later deposits on the shore of Bear Lake, Utah, collected by the Hayden Survey, in company with *Planorbis trivolvis* Say (var.), *Carinifex newberryi* Lea, *Lymnæa utahensis* Call, and *Fluminicola fusca* Hald. There are about 200 valves in the lot, including one right and one left of rather small juv. The specimens are in the collection of the A. N. S. P., No. 62825.

This *Sphærium* cannot be ranged under any of the described recent species. Of about the same length with *S. sulcatum* Lam., the mussel is of very different shape and appearance: much higher, much more inequipartite, the beaks are much narrower and more prominent; the shell and hinge are stronger. It resembles more some forms of *S. aureum* Pr. (resp. forms ranged under that species), but is larger, more inequipartite and oblique.

It is worthy of notice that in numerous specimens the hinges are partially or wholly reversed, just as in most of our recent species of this group, and the posterior cardinal tooth of the left valve is wanting or rudimentary, in some specimens well enough preserved to show such details. So far as can be seen from a few fresher, not chalky, specimens, the color was whitish or reddish to grayish, and the surface shining.

The species is named in honor of Dr. H. A. Pilsbry, to whom I am indebted for the opportunity of examining this fine lot of fossils.

NOTES.

Note on *Pholadomya pacifica* Dall. This species was first diagnosed in the Smithsonian Miscellaneous Collections, Quarterly Issue, July, 1907, no. 1727, p. 172. The fuller description and account which appeared in the March number of the NAUTILUS (1909) had been prepared and sent to the editor in May, 1907, as the publication of my paper in the Quarterly was then indefinitely delayed. As I saw no proofs of the NAUTILUS issue, this fact is not stated in it, but I now make the correction. Since both notices were prepared, another complete specimen in excellent condition was discovered in the Albatross collection, but unfortunately, though fresh, it did not contain the soft parts. The presence of a resilium was confirmed. The localities of the two dredgings have been received.

They are station 4904, near Nagasaki, in 107 fathoms, sand and shell, bottom temperature about 53° F., and station 4807, off Hakodate, in 44 fathoms, gravel, temperature about 45° F., judging from that at nearby stations. The fresh specimen is of a creamy white, faintly pearly internally. I may add that the two species of alleged *Pholadomya*, referred to in the text of the NAUTILUS article, are now considered to belong to the genus *Panocca* (Dall, 1905) with several others dredged in the deep waters of the Atlantic.—WM. H. DALL.

MR. L. V. DALTON, in the Quarterly Journal of the Geological Society (London), lxiv, Nov. 1908, p. 631, records *Busycon canaliculatum* (L.) from the Miocene of Burma. His figure will scarcely convince skeptical American conchologists. From what we know of the geological history of the shell in question and its allies, and taking into consideration the fact that the veliger stage in *Busycon* (*Fulgur*) is passed through inside the egg-capsule, and hence it has no free swimming period, a record of its distribution half round the earth needs better evidence than Mr. Dalton is satisfied with.

SHELLS OF AROOSTOOK COUNTY, MAINE.—Dr. V. Sterki has this winter examined a part of my collection of small land shells, and the result of his labor has been the identification of the following additions to those already reported from Aroostook county, Maine:

Strobilops affinis Pils.
Vertigo ovata Say.
Vertigo nylanderi Sterki.
Euconulus chersinus Say.

All the above were collected in the town of Woodland.—OLOF O. NYLANDER.

The oyster is cool and clear and calm,
Admired by the many and not the few;
Yet, sorry to say, possesses a way
Of getting himself in a stew.

ERRATA.—Numbers 8, 9 and 10 of Vol. xxi were marked by error "Vol. xxii" on the date lines, pages, 85, 97, 109, but not on the cover of those numbers. This note is published to obviate errors in binding Vol. xxi.

The following corrections should be made in Vol. xxii:

P. 47, end of line 4, delete 7.

P. 78, 7th line from foot, for plate vi, read vii, viii.

P. 82, top line, for NAUTILUS xxii, read xxi.

P. 101, under *Quadrula coccinea*, in place of "*Found gravid on June 18*," *etc.*, it should read: *Found gravid by the writer on June 18, '08, in Neshannock Creek, Lawrence Co., and received gravid from the Allegheny River, McKean Co. (collected by Mr. Dennis Dally on June 22, '08).*

THE marriage is announced of Miss Elizabeth J. Letson, Director of the Buffalo Academy of Natural Science, to Mr. William Alanson Bryan, of the Pacific Institution of Science, on March 16th. Mr. and Mrs. Bryan will be at home in Honolulu after May 4th.

DR. V. STERKI is spending the month in studying *Sphærium* and *Pisidium* in the museums of Boston, Cambridge, Philadelphia and Washington.

MR. A. A. HINKLEY, who returned from a collecting trip in Mexico last month, reports good collecting, especially in freshwater mollusks.

AN interesting biographical memoir of William More Gabb, the palaeontologist and conchologist, read by Dr. W. H. Dall at the November meeting of the National Academy of Sciences, has just been published. A bibliography of Gabb's scientific works is appended.

THE

NAUTILUS

A MONTHLY JOURNAL
DEVOTED TO THE INTERESTS OF
CONCHOLOGISTS

VOL. XXIII.

MAY, 1909, to APRIL, 1910.

149572
17/4/1

EDITORS AND PUBLISHERS:

H. A. PILSBRY, Curator of the Department of Mollusca, Academy of Natural Sciences, PHILADELPHIA.

C. W. JOHNSON, Curator of the Boston Society of Natural History, BOSTON.

INDEX

TO

THE NAUTILUS, VOL. XXIII.

INDEX TO SUBJECTS, GENERA AND SPECIES.

Aeolidiella pupillosa 36
Aldabra, the land mollusca of 69
Alvania bakeri Bartsch, n. sp..... 137
Amnicola crosseana Pils., n. sp. (Pl. 9, fig. 6) 98
Amnicolidae of the Panuco River system, Mexico..... 97
Anodonta dakota Frierson, n. sp. (Pl. 10)..... 113
Astarte newtonensis Aldr., n. sp. (Pl. 11, fig. 2, 3)..... 121
Auriculella 122
Bela blaneyi Bush, n. sp. fig. 1) 61
Bela incisula Verrill 62
Bergh, Ludwig Rudolph Sophus (Obituary) 72
Bermuda, a new land shell from 63
Bermuda, a new Rissoa from 65
Bifidaria armifera Say, and its varieties 52
Bifidaria armifera var. abbreviata Sterki, n. v..... 53
Bifidaria armifera var. affinis Sterki, n. v. 53
Bifidaria armifera var. interpres Sterki, n. v. 53
Bifidaria armifera var. similis Sterki, n. v. 53
Binney, William G. 60
Britts, Dr. John H. 120
Bronx Borough, New York, fresh water fossils of 10
California, Mollusca of San Bernardino County 73
Carinifex sanctæclaræ Hannibal, n. sp. (fossil)..... 40

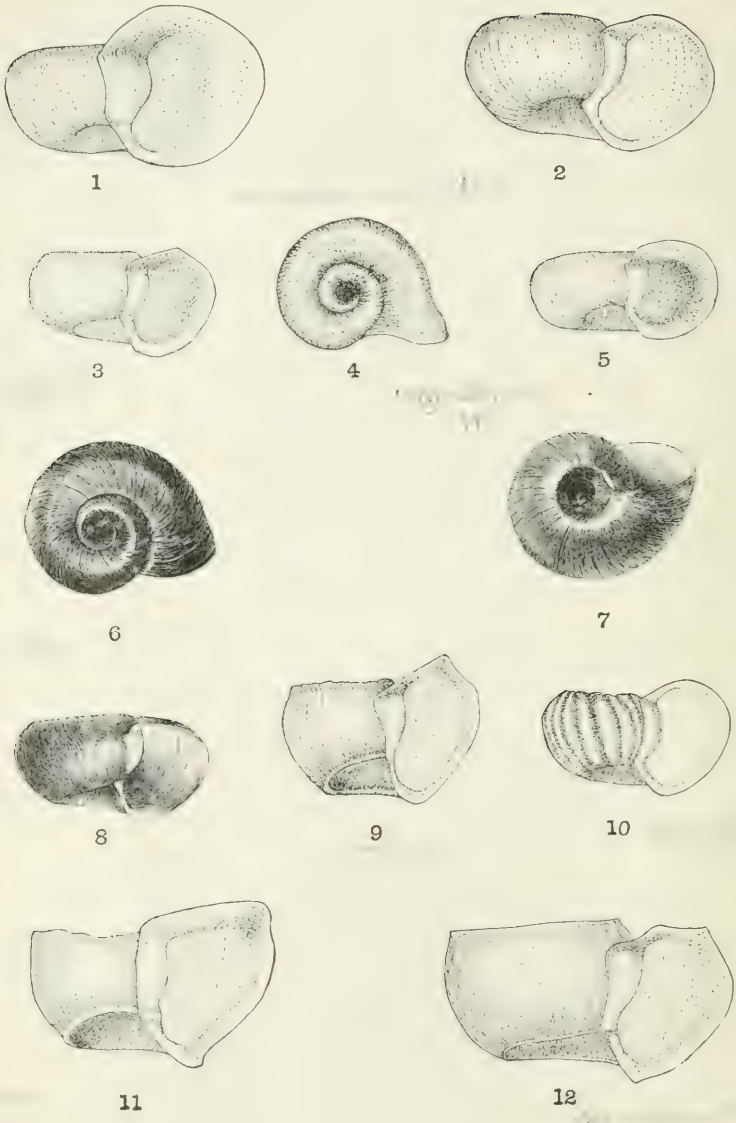
Cepolis alauda cymatia Henderson, n. subsp. (Pl. 4, fig. 4) 51
Chondropoma hendersoni Torre, n. sp. (Pl. 4, fig. 6) 49
Cochliopa compacta Pils., n. sp. (Pl. 9, figs. 4, 5) 99
Cochliopa picta Pils., n. sp. (Pl. 9, figs. 1, 2) 100
Cochliopa riograndensis Pils. & Ferr. 99
Conchological museum for Japan 124
Coryphella rufibranchiatus chocolata Balch, n. var..... 33
Coryphella rufibranchiatus mananensis.....35, 37
Cratena veronicæ Verrill 36
Cuban land-shells, description of new 49, 50
Cypraea tigris, deformed (Pls. 7, 8)..... 85
Dohrn, Prof. Anton 84
Elasmias Pils, n. gen. 122
Emmericiella Pils., n. subg. 45
Emmericia (Emmericiella) longa Pils., n. sp. (Pl. 5, figs. 11, 12) 46
Emmericia (Emmericiella) novimundi Pils., n. sp. (Pl. 5, figs. 9, 10) 46
Essex County notes, [Mass.]..... 86
Ferguson, Collection 44
Ford, John (obituary and portrait) 126
Frenchman's Bay, Maine, list of shells from 62
Grand Canyon of the Colorado 109
Helicina orbiculata clappi Pils., n. subsp. 90
Helicina torrei Henderson, n. sp. (Pl. 4, figs. 1-3 50
Holospira bartschi, an internal septum in..... 32
Homalogyra atomus in Rhode Island 83
Kaliella aldabraensis 69
Kaliella turbinata Gulick 64
Kansas, mollusks from 91
Kansas, the mollusca of Douglas County 81, 94
Lamellidea Pils., n. sect. 123
Lamellovum Pils., n. sect. 123
Lartetia Bgt. 47
Leptogyra alaskana Bartsch, n. sp..... 136
Linter, Miss J. E. 84
Lymnaea cubensis aspirans Pils., n. subsp. 120
Lymnaea nashotahensis Baker, n. sp. (fossil) 19

Lymnaea stagnalis lillianae Baker, n. var.....112, 125
Lymnaea umbilicata, range of 80
Macroceramus hendersoni Torre, n. sp. (Pl. 4, fig. 5) ... 49
Mexico, Mollusks from northeastern 45
Mitra (Chrysame) waltonensis Aldr. n. sp. (Pl. 11, fig. 1) 121
Mitsukuri, Dr. Kakichi 120
Musculium parvum Sterki, n. sp. 67
Musculium, observations and notes on 17
Musculium winkleyi Sterki, n. sp. 66
Nudibranchs, notes on New England 33
Nudibranchs, rectification of the nomenclature 100
Odostomia (Evalea), cookeana Bartsch, n. sp..... 138
Odostomia (Evalina) katherinae Winkley, n. sp. (Fig.). 88
Odostomia sulcosa 62
Oklahoma, mollusks from..... 91
Olivella porteri Dall, n. sp..... 133
Onoba asser Bartsch, n. sp..... 138
Pachypoma lithophorum Dall, n. sp..... 135
Pachypoma magdalena Dall, n. sp..... 135
Paladilhia Bgt. 47
Paludestrina protea Gould. 78
Parreysia, Systematic position of..... 139
Pisidium marci Sterki, n. sp. 42
Planorbis bicarinatus Say. (Pl. 1, fig. 3) 21
Planorbis bicarinatus var. augistomus Hald. (Pl. 1, figs. 4, 5) 4
Planorbis bicarinatus var. aroostookensis Pils. (Pl. 1, figs. 1, 2) 7
Planorbis bicarinatus var. corrugatus Currier, (Pl. 1, fig. 10) 5
Planorbis bicarinatus var. percarinatus Walk., n. n. (Pl. 1, fig. 12) 6
Planorbis bicarinatus var. portagensis Baker, (Pl. 1, fig. 9) 8
Planorbis bicarinatus var. royalensis Walk., n. v. (Pl. 1, fig. 11) 9
Planorbis bicarinatus var. striatus Baker 7

Planorbis bicarinatus var. unicarinatus Hald., (Pl. 1, figs. 6, 8) 3
Pomaulax turbanicus Dall, n. sp. 134
Planorbis binneyi Tryon, note on 41
Pterides Pils., n. gen. 47
Pterides bisinulabris Pils., n. sp. (Pl. 5, figs. 7, 8) 48
Pterides pterostoma Pils., n. sp. (Pl. 5, figs. 1, 2, 5, 6) ... 48
Pterides rhabdus Pils., n. sp. (Pl. 5, figs. 3, 4) 48
Pyramidellidæ, New England 39
Pyramidellidæ, more notes of the family 54
Pyramidella (Sulcorinella) bartschi Winkley, n. sp. (fig.) 39
Rissoa (Nodulus) stewardsoni Van., n. sp. (Fig. 1) 65
Siphonaria lineolata Sowb. 132
Siphonaria naufragum Stearns 132
Somatogyrus mexicanus Pils., n. sp. (Pl. 9, fig. 3) 98
Sphaerium lineatum Sterki, n. sp. 142
Stearns, Dr. R. E. C. (Obituary and portrait) 70
Strobilops floridana Pils., n. sp. 90
Squid, suckers from the big (figs. 1-4) 43, 83
Tornatellinidæ, classification of 122
Tornatellides Pils., n. gen. 123
Tornatellaria Pils., n. sect. 123
Unionidæ, a new system of the 114
Unionidæ from an Indian garbage heap 11
Unionidæ from Arkansas and Louisiana 102
Variation 15
Valvatidæ of Western North America 104
Valvata calli Hannibal, n. sp. 107
Valvata whitei Hannibal, n. sp. 107
Valvata humeralis Say. 105
Valvata virens Tryon 106
Veronicella nilotica Cockerell, n. sp. 108
Viviparus contectus in Philadelphia 60
Whiteaves, Joseph F. (Obituary) 84
Zonitoides bermudensis Pils. & Van., (Fig. 1) 63

INDEX TO AUTHORS.

Aldrich, T. H. 121
Baily, Jr., J. D. 60
Baker, F. C. 19, 41, 80, 91, 112, 125
Balch, F. N. 33, 100
Bartsch, Paul 54, 136
Berry, S. S. 73, 129
Blake, J. H. 43, 83
Blaney, Dwight 62
Bush, Katherine J. 61
Cockerell, T. D. A. 108
Dall, W. H. 70, 133, 144
Ferriss, J. H. 109
Frierson, L. S. 113
Gwyer, C. Dayton 44
Hand, E. E. 120
Hanna, G. D. 81, 94
Hannibal, Harold 40, 104
Henderson, Jr., J. B. 50
Hirase, Y. 124
Humphreys, E. W. 10
Morse, E. S. 83
Ortmann, A. E. 11, 114, 139
Pilsbry, H. A. 32, 45, 63, 85, 89, 97, 120, 122, 126, 132
Smith, Maxwell 69, 108
Sterki, V. 17, 42, 52, 66, 142
Torre, Carlos de la 49
Vanatta, E. G. 63, 102
Walker, Bryant 1, 21
Winkley, H. W. 12, 39, 68, 86



PLANORBIS BICARINATUS AND ITS SUBSPECIES.

The Nautilus.

Vol. XXIII. MAY, 1909. No. 1.

NOTES ON PLANORBIS II: P. BICARINATUS.

BY BRYANT WALKER.

Planorbis bicarinatus Say. Pl. I, fig. 3.

1817. *Planorbis bicarinatus* Say, Nich. Encyc., pl. i, f. 4.

1822. *Helix angulata* Rackett, Lin. Tr. xiii, p. 42, pl. v, f. 1.

1834. *Planorbis engonatus* Conrad, N. F. W. Shells, sup. p. 8, pl. ix, f. 8.

1834.? *Planorbis antrosus* Conrad, Am. J. Sc. (1) xxv, p. 343.

1861.? *Planorbis lautus* H. Adams, Proc. Zool. Soc., Lond. 1861, p. 145.

This common and well-known species is one of the characteristic species of the fresh-water pulmonate fauna of eastern North America. It stands quite by itself, having, with the exception of the recently described *P. eucosmius* Bartsch from North Carolina, no closely related species in our fauna. It is the type of the subgenus *Helisoma* Swainson.

The shape of the shell is so well marked and distinctive that the synonymy is, as shown above, comparatively small. The *Helix angulata* of Rackett was, in all probability, described in entire ignorance of Say's previous description.

The type of Conrad's *P. engonatus* seems to have disappeared. According to Haldeman, who saw the "single original specimen," then in the collection of a Mr. Mason, it was a monstrosity. Conrad's figures are poor, but Haldeman's (Mon., pl. i, figs. 5 and 6), which are apparently excellent, confirm his opinion. It was found

at Albany, N. Y. Jay (Catalogue, 4th Ed., 1852, 10267) lists *P. bicarinatus* var. *engonatus* from Georgia. Through the courtesy of Mr. L. P. Gratacap, of the American Museum of Natural History, I have been able to examine these shells. Of the eight specimens in the set, one is a *P. campanulatus* Say, nearly but not quite mature; the remainder do not differ from the usual form of *bicarinatus*, except that the mature ones have a more or less expanded lip, and might well be referred to the form described by Haldeman as var. *angistomus*. None of them exhibit the peculiar flattening of the body whorl characteristic of *engonatus*. It seems probable that these specimens were referred to Conrad's species on account of the campanulate aperture.

What the *P. lautus* of H. Adams really is, is a matter of conjecture, which can be only definitely settled by reference to the type, if it is still in existence. In the meantime Tryon's supposition that it was a young specimen of his species seems probable enough to warrant its reference to *bicarinatus*, and thus eliminate it from the list of unknown American species.

Conrad's *P. antrosus* is no doubt a form of Say's species, and is quite probably the campanulate variety described by Haldeman as var. *angistomus*, under which it will be further discussed.

Say does not give the locality of the typical form in connection with his original description, but in describing the next species, *P. parvus*, mentions that both inhabited the Delaware, so that there is practically no doubt but that the types came from that river. The Delaware River form (pl. I, fig. 3) is the common manifestation of the species as it is usually found throughout the United States. Say's description, though brief, is excellent, and leaves little to be desired. An apparent typographical error occurs in the reprint from the 3d Ed. of Nicholson's Encyc., and probably in the original, as it is followed by Binney in his edition of Say's writings. The description as printed reads: "Shell subcarinate above, and beneath translucent." If the comma was placed after "beneath" instead of after "above," the sentence would be in better accord with the facts and in all probability with the intention of the author.

The name adopted by Say in his new species is almost a misnomer, as the typical form is really not carinated at all, either above or beneath. In both places it is rather a more or less acute angulation, and is never raised into a carina as, for instance, in *Valvata tricarinata* Say.

It is to be noted that Say, with his usual nice observation, describes the minute, revolving lines which are still characteristic of the Delaware River form, and which are not uncommon in specimens from other localities. In many instances, however, they are entirely lacking. Say described his species as sinistral. Without going into the question as to whether the shell is really sinistral or ultra-dextral, it may be said that with the exception of Say's original figures, and those of Call (Rep. Dept. Geol. Ind., 1899, p. 411, pl. viii, fig. 10), all the published illustrations known to the writer treat it as dextral, and in accordance with this practically universal custom the figures for the present paper have been drawn in that position. Those who prefer to consider the shell as sinistral have only to reverse the plate.

Considering the enormous extent of territory which it inhabits, and the diverse conditions of local environment to which it is subjected in different parts of its range, *P. bicarinatus* is, for a freshwater pulmonate, remarkably uniform in its development, and comparatively few varietal forms have been described, and most of these have been distinguished within the last few years. Taking them in the order of their appearance, they are as follows:

I. Var. UNICARINATUS Hald., pl. I, figs. 6, 7 and 8.

Planorbis bicarinatus v. *unicarinatus* Haldeman, Monograph, p. 7 (1844).

"Whorls of the right (upper) side rounded; the carina on the left side revolves closely, so as to form a very narrow umbilicus, and the aperture is much extended towards the left." (Haldeman.)

Haldeman did not figure this form, but fortunately his type has been preserved in the collection of the Philadelphia Academy, and the figures here given have been drawn from it. It is very doubtful whether this form is entitled to varietal rank in the proper acceptation of the term. It will be observed from the figure that the inner whorls on the upper side are distinctly angulated, and that the angle does not wholly disappear until just before the aperture is reached. Such specimens are not uncommon in almost any large series, and all gradations from the bicarinate to the unicarinate form can be found in the same colony. It would seem, therefore, to be an individual rather than a racial characteristic. The form, however, is of interest as exhibiting the first step toward the purely ecarinate form described by Pilsbry as var. *aroostookensis*. The type came from the Schuylkill River.

II. Var. ANGISTOMUS Hald., pl. I, figs. 4 and 5.

Planorbis bicarinatus var. *angistoma* Haldeman, Mon., p. 7 (1844).

"Shell small, aperture campanulate, with the throat narrowed." (Haldeman.)

Haldeman did not figure this "variety," and his brief diagnosis copied above gives neither the dimensions of his type nor the locality from which it came. The type is not to be found in the collection of the Philadelphia Academy, and is apparently lost.

The claims of this form for varietal recognition are but little, if any, stronger than those of var. *unicarinatus*. In nearly all mature shells of *bicarinatus* there is a tendency, more or less developed, for the lip to become everted, and there is no difficulty in selecting a series showing all degrees of variation in this particular from the same locality. It is only occasionally that all the specimens in the colony are affected at the same time and to approximately the same degree. But sometimes this feature is very persistent; thus in the set from which the figure was selected not only are all the specimens (38) decidedly campanulate, but all previous lips were also campanulate, many of the specimens having two and some even three, the result being that the outline of the shell is in several instances greatly distorted. All the specimens from this locality were unusually flat, being very wide in proportion to their height. Similar specimens in all respects were collected in Bawbeese Lake, Hillsdale Co., Michigan, one of which, having a diameter of 16.5 mm., is only 4 mm. in height immediately in front of the aperture, the latter being 8 mm. in height. Some of these also are greatly distorted, showing apparently the effects of an unfavorable environment. Shells from Pine Island Lake, Kent Co., and Four Mile Lake, Chelsea, Mich., are somewhat similar, but the peculiar form is less strongly developed.

In many cases, no doubt, the sudden expansion of the lip is to be accounted for by unusually favorable food conditions at the time when the animal had really completed its normal growth; the consequent suddenly-acquired corpulency of the animal necessitating a special, rapid and expansive growth of the shell to accommodate its increased size. This seems to have been the case with the colony from which Figure 1 was taken. Up to maturity the shell was a typical *aroostookensis*, when suddenly the enormously expanded lip was developed. In this case, too, the whole colony was apparently

affected, at least the ten specimens which are now in my possession were all more or less, and that, too, without regard to size.

It seems quite probable that Conrad's *P. antrosus* from Randon's Creek, near Claiborne, Ala., is identical with this form. If so, and the form is worthy of varietal recognition, it would have priority over Haldeman's name.

Conrad never figured his species, and unfortunately gave no dimensions in his description. His specimens seem to have disappeared, and according to Tryon, in 1870, Conrad himself had forgotten all about it.

It is possible, however, that some of the original lot found their way to Europe, as the species was catalogued by Beck in 1837 as being in the collection of Prince Christian Frederick (Index Moll., p. 118, 1837). Whether these specimens are still in existence I do not know.

III. Var. CORRUGATUS Currier, pl. I, fig. 10.

Planorbis bicarinatus var. *corrugata* Currier, List of the Shell-bearing Mollusca of Michigan, p. 8, 1868.

This form was never described by Currier, who simply gives the locality as Perch Lake, Kent Co., Mich.

The figure is drawn from an authentic specimen (No. 3993, Coll. Walker), received from the late Dr. De Camp, who, in his Michigan Catalogue, described and figured several of Currier's species, but unfortunately neglected this one.

I have never seen but the single specimen from this locality, and do not know whether any more like it were found or not.

The form is peculiar in the strong, transverse plications, which extend entirely around the whorl, and are scarcely interrupted by the well-developed, superior and basal carinations; towards the aperture, however, they become less distinct. The revolving, incised lines are also deeply cut, and in this feature the form is similar to the var. *striatus* of Baker. It is altogether the most heavily sculptured form that I have seen. The specimen figured is rather small, measuring 9 mm. in diameter and 5 in height. The body whorl immediately in front of the aperture is 3 mm. in height. Individual specimens of var. *striatus* Baker from Long Lake, Grand Traverse Co.; Dead River, Ives' Lake, Mountain Lake, Little Lake and Howe Lake, Marquette Co.; Orchard Lake, Oakland Co., and Mud Lake, Montcalm Co., Michigan, and Gelot's Lake, New Sweden,

Me., exhibit a greater or less tendency to develop the transverse plications of this form, but none of them with anything like the strength or regularity of the specimen figured.

Similar specimens occur in the marl deposits at Bad Axe and other localities in Tuscola Co., Mich.

It is doubtful whether this form is entitled to rank as a variety. It is evidently an extreme development of the var. *striatus*, in which the transverse plication has been added to the revolving sculpture. If the name had not already appeared in the literature without description, and required explanation, I should hesitate to describe it as varietally distinct from *striatus*.

IV. Var. PERCARINATUS n. n., pl. I, fig. 12.

Planorbis bicarinatus major Walker, NAUT. VI, p. 136 (1893); *non* var. *major* of various species of various authors.

Shell very large for the species, thick and solid, dark horn-color tinged with purple; superior and basal carinæ elevated into a distinct keel, which is white; lip thickened, edged with brown, behind which externally is a broad, yellowish-white band, within banded by deep reddish-brown; lines of growth distinct, stronger and "puckered" around the carinæ; revolving lines very faint, not discernible except with a lens; aperture more or less expanded, sometimes distinctly campanulate, auriculate and distinctly modified by the extension of the carinæ to the lip.

The specimen figured measures 18.5 mm. in diameter and 10 mm. in height; height of body whorl in front of aperture 7.25 mm.; height of aperture 10.5 mm. A larger specimen, with a campanulate aperture, measures 19.75 mm. in diameter and 10.5 mm. in height.

Types (Nos. 3419 and 20074, Coll. Walker) from Crystal Lake, Benzie Co., Mich. Also from Pine Lake, Charlevoix Co., Mich. (Walker), and Rideau and Ottawa Rivers; Sparrow Lake, Simcoe Dist., Ontario, and Detroit Lake, Minn. (Pils.).

The original specimens, collected by the late Dr. M. L. Leach, were all dead shells, more or less bleached. The above description has been prepared from fresh specimens from the same locality collected by Dr. R. J. Kirkland, of Grand Rapids. Not in deference, for I think the rule an absurd one, but under the compulsion of the "International Code," I am forced to change the name of this very distinct variety and add another unnecessary synonym to the burden of systematic conchology.

V. Var. AROOSTOOKENSIS Pilsbry, pl. I, figs. 1 and 2.

Planorbis bicarinatus aroostookensis Pilsbry, NAUT. VIII, p. 115, 1875.

Shell having the spire and umbilicus very deep, the latter funnel-shaped, as in typical *bicarinatus*, but both upper and lower keels entirely obsolete or rounded off on the last whorl, which has the aspect of *P. trivolvis*. Surface minutely striated spirally, as in *P. bicarinatus*. Aperture less angular and less produced below than in *bicarinatus*, in consequence of the rounding of the whorls. Diameter 15 mm., alt. at aperture 7.5 mm. (Pilsbry).

Type locality, East Branch of Salmon Brook, Woodland, Aroostook Co., Maine (Pils.). Also Collins' Pond, Caribou River, Caribou, Aroostook Co., Me.; Charlevoix; Perch Lake, Kent Co.; Bessemer, Gogebec Co.; Fallams, Menominee Co., and Ispheming, Mich. (Walker).

Figure 2 represents the typical form of this variety, and is drawn from a topotype collected by Mr. O. O. Nylander. Figure 1 is the campanulate form, already referred to, which bears the same relation to typical *aroostookensis* that *angistomus* does to typical *bicarinatus*.

The Michigan specimens, especially those from the Upper Peninsula, are much smaller than the typical form, and in some examples there is a tendency to angulation on the whorls, but the large majority of the specimens are quite characteristic in the rounded, ecarinate form of the last whorl.

VI. Var. STRIATUS Baker.

Planorbis bicarinatus striatus Baker, NAUT. XV, p. 120 (1902); *Planorbis bicarinatus striatus* Baker, Trans. Acad. Sci., St. Louis, xvi, p. 9, pl. i, fig. 11 (1906).

In this form the microscopic, revolving sculpture commonly but not invariably present in the typical form is greatly intensified, and in the typical expression of the variety is quite conspicuous to the naked eye.

In the original description this sculpture is stated to consist of "raised spiral lines," while in the second paper quoted above it is said that "in some specimens the spiral lines are deeply incised." This incongruity is an apparent one only, and depends on whether the elevated or the depressed portions of the surface are wider or more conspicuous. Starting with the typical form, in which the revolving sculpture is either entirely wanting or very minute, it is

clear that the lines, when present, are incised. As the sculpture increases in strength, the intervals between the incised lines diminish, and when they become equal, the surface becomes typically striate and the revolving sculpture consists of incised or elevated lines, as the observer chooses to designate it.

Very rarely the surface is distinctly malleated, in which case there is a series of irregular, raised, revolving lines, which are quite different from the regular sculpture of var. *striatus*. The intensification of the spiral sculpture characteristic of this form seems to be peculiar to the northern states, as it has not been noticed from south of Mason and Dixon's Line. The most characteristic specimens come from the northern tier of states from Maine to Michigan.

The types were pleistocene fossils from Milwaukee, Wisconsin. It is a common form in Michigan, varying in size and proportion like typical *bicarinatus*. Specimens are also before me from the following localities: Square Lake; Rockville, Me.; Profile Lake, N. H.; Cedar Lake, N. Y.; Port Oram, N. J.; Gore's Bay, Manitolin, Id., Lake Huron, Algoma; Georgian Bay, Ontario.

VII. Var. PORTAGENSIS Baker, pl. I, fig. 9.

Planorbis bicarinatus portagensis Baker, NAUT. XXII, p. 45 (1908).

This recently described and very striking form is characterized by its closely coiled whorls, deeply funicular upper and lower surfaces and acute carination; the umbilicus is comparatively narrow and deeply excavated; the aperture is large, auriculate, higher than wide, and acutely angled above and before; the lip is sharp and but slightly expanded. Ht 8.0 Diam 14.0

Type locality, Portage Lake, Aroostook Co., Maine. Also Square Lake, Cross Lake and Second Lake, Aroostook Co., Me. (Walker); Meaches Lake, Hull, Quebec (Pils.).

The figure is drawn from a cotype kindly furnished by Mr. F. C. Baker. Specimens from Carp Lake, Emmet Co., and Betsey Lake, Benzie Co., Michigan, though not typical, may fairly be referred to this form. Immature examples, especially those from Betsey Lake, are almost identical with the immature Maine specimens, the whorls, perhaps, being more regularly rounded and lacking the decided flattening towards the base of the typical form. But the mature shells, though retaining the sharp carination above and below, are more inflated, and the aperture is wider and does not extend so far above and below the body whorl as in the typical form, being in shape and

position more like that of var. *percarinatus* (fig. 12). Two additional specimens from the original locality, submitted by Mr. Nylander, agree very exactly with the Michigan form.

Mr. Nylander writes in regard to the habits of this form: "I think the variety *portagensis* lives in comparatively deep water, say 25 feet or so as only a few good specimens have been collected and these have always been "dead" shells. The specimens from Cross Lake were dredged in 25 feet of water.

This raises a question as to whether the inflated form of this variety is not correlated with its habitat in deep water as suggested by Pilsbry in regard to the *Physa* and *Planorbis* from Lake Patzcuaro, Mexico (Proc. P. A. N. S., 1891, p. 324).

A parallel case is found in *Lymnæa mighelsi* W. G. Binn, which in Michigan, at least, lives in deep water a large part of the year (See NAUT., XIV, p. 8). In fifteen years' collecting at Pine Lake, Marquette Co., Mich., I have found this species only twice in shallow water and then in considerable numbers, but only for a few days. It seems likely that the peculiar form of *Physa lordi* Bd. is to be accounted for in the same way as in Michigan; at least, it is found only in the larger inland lakes. *Planorbis multivolvis* Case is also apparently a deep-water species (NAUT., XXI, p. 61).

VIII. Var. ROYALENSIS n. v., pl. I, fig. 11.

Shell thin, light greenish horn-color; superior carination prominent, rounded, not acute; basal carina very strong, not acute, but forming a heavy, rounded cord around the deep, funicular umbilicus; upper surface concave, but more or less flattened and not as deep as the umbilicus; sides flattened and narrowed towards the base and contracted just above the basal carina; lines of growth strong and distinct, the sides being longitudinally coarsely and irregularly striated; revolving sculpture strong and distinct; aperture triangular, the upper side very nearly straight and almost flat, meeting the lip at nearly a right angle; acutely angled below; lip thin, sharp, not expanded. Alt. 10, diam. 15; height of body whorl in front of aperture 5 mm.

Types (No. 29163, Coll. Walker) from Siskowit Lake, Isle Royale, Lake Superior, Michigan. Cotypes in the collection of the Philadelphia Academy.

About twenty specimens of this strongly characterized form were

collected by the University of Michigan expedition in 1905, and are very uniform in the peculiar features above described. *P. bicarinatus* was collected in 1904 and 1905 in a number of different localities in various parts of the island, but all such were quite typical in form.

The longitudinal sculpture of this form is unusually strong for the species, and reminds one of the heavy sculpture of *P. corpulentus* Say, but differs in being less regular and lacking the acute ridges of that species. *Royalensis* is nearer to *portagensis* than to any other form of *bicarinatus*, but differs in being wider and in the development and position of the superior carina, wider umbilicus, stronger basal carina and shape of the aperture.

(*To be continued.*)

RECENT FRESH-WATER FOSSILS FROM BRONX BOROUGH, NEW YORK CITY.

BY EDWIN W. HUMPHREYS.

The shells here mentioned were found at what is now 171 St. and Morris Ave., Borough of the Bronx, New York City. The swamp which is situated at this point lies in a long, narrow, anticlinal valley which has been eroded in the Inwood Limestone. When the street, now known as Morris Ave., was filled in across the swamp, the peaty deposit, which had accumulated here, was forced up to heights of several feet on either side of it. This caused the peat to crack in all directions and revealed numerous pockets which were full of small shells. The shells were extremely abundant; so thickly were they heaped together that they could easily be scooped up with a garden trowel. From the manner in which they were found it would seem as if they had been gathered together by currents or eddies in the waters of the swamp. All of the shells were bleached to a chalky whiteness and were very fragile. The following species were found.

Amnicola limosa (Say) Hald. Shells of this species, though common, were not very abundant and were usually more or less injured.

Valvata tricarinata Say. These were exceedingly numerous, hundreds of them being heaped together in a single pocket. They were of all sizes, some being so small that they were lodged in the apertures of the larger ones. Evidently they represented individuals of all ages.

Physa heterostropha Say. This species was rather scarce.

Planorbis bicarinatus Say. This form was also uncommon.

Planorbis parvus Say. These varied in size as much as did the shells of Valvata tricarinata Say, and were about as abundant.

Pisidium variable Prime. This species was very rare. Usually the valves were separated, only occasionally were they found united.

Whether or not these forms still inhabit this place I am not prepared to say. Though I have not been able to find any living individuals, further search may yet reveal them.

I desire to acknowledge the assistance of Mr. L. P. Gratacap and Mr. Bryant Walker in the identification of some of the species.

UNIONIDAE FROM AN INDIAN GARBAGE HEAP.

BY DR. A. E. ORTMANN, CARNEGIE MUSEUM, PITTSBURGH, PA.

On the western banks of the Monongahela River in southwestern Pennsylvania, upon the flood plain at the Point Marion Ferry, in Greene Co., opposite the point where the Monongahela and Cheat rivers unite, the writer found on July 9, 1908, a heap of *Unionidæ* shells, buried about one to two feet in the soil on the side of a road. The soil consists of the characteristic river-silt of this region. Since Indian "relics" have frequently been found at this place, in fact, since it is known as the site of an old Indian settlement, it seems beyond question that this pile (about 2 feet high) represents an old Indian garbage heap of shells which had been used for food.

When first found, the shells were rather brittle and soft, and many of them crumbled to pieces. But enough were secured, which remained whole, and subsequently they have hardened. They look like fossil shells in so far as in most of them the epidermis, and with it the color, is gone (only in a few *Quadrulas* fragments of the epidermis remain). In species, where the nacre originally is colored (*Unio gibbosus* and *crassidens*), the color has entirely faded away, or only very slight traces of it are discernible.

It is hard to say how long ago this pile was formed: it may be less than a hundred years old. But this does not matter. The interesting fact about it is that this shell heap has furnished a small collection of *Unionidæ*, which contributes considerably to our knowledge of the *Unionidæ*-fauna of the Monongahela River drainage.

At the present time, on account of the pollution of the water, this fauna has completely disappeared in the Monongahela proper: there

is not a single living mussel in this river from Pittsburgh to the West Virginia state line (which is within a mile and a half to the south of our locality). Only a few of the tributaries contain mussels, and the most important one is the Cheat River, in which (in Pennsylvania), a rich fauna is yet present within two miles of our locality. The writer has collected repeatedly in the Cheat, in Fayette Co., from a point about a mile above Point Marion up to Cheat Haven, close to the State line. Another locality for *Unionidæ* is about three miles to the north, in Dunkard Creek, Greene Co., where the writer also collected a number of species. It is interesting to compare these faunas with that of the Indian garbage heap at Point Marion Ferry, which either comes from the Monongahela proper, or from the Cheat.

I give first here a list of the latter.

1. *Truncilla perplexa cincinnatiensis* (Lea). 3 double, 11 isolated valves, all males of medium and small size. This is not the typical *cincinnatiensis*, but a form intermediate between this and the typical *perplexa* (Lea); the nodes upon the disc are rather small and more numerous than in the typical *perplexa*, but they are less numerous than in *cincinnatiensis*.

Tuberculate forms of *Truncilla perplexa* have never been found recently in western Pennsylvania; all specimens of *perplexa* of this region belong to the next variety.

2. *Truncilla perplexa rangiana* (Lea). 6 double, 7 isolated valves, all males of medium and small size.

Not found at present in the Monongahela drainage, but rather abundant in the Allegheny River from Armstrong County upward. Also in the Shenango River in Lawrence County; the nearest localities at present are about 80 to 100 miles away from Point Marion.

3. *Lampsilis ventricosa* (Bar.). Fragment of one left valve; young specimen.

At present near Point Marion, both in the Cheat River and Dunkard Creek. Widely distributed in western Pennsylvania.

4. *Lampsilis ventricosa ovata* (Say). Fragment of one left valve (beak portion); young specimen.

Not found at present in the Monongahela drainage. It used to be in the Ohio in Allegheny County, and is yet found in the Ohio in Beaver County and in the Allegheny in Armstrong County and farther up.

5. *Lampsilis multiradiata* (Lea). 2 double, 1 single valve; me-

dium size. Although the characteristic color of the epidermis is gone, these specimens agree completely with this species in the shape of the shell and of the hinge teeth.

This species is found in the Cheat River and elsewhere in western Pennsylvania, preferring smaller streams.

6. *Lampsilis ligamentina* (Lam.). 4 isolated valves; one young, the others of medium size.

At present in the Cheat River, but not abundant. It is the most abundant species in the large rivers of western Pennsylvania.

7. *Obovaria circulus* (Lea). 1 left valve; small. Not typical, inclining toward *O. lens* (Lea) in shape; probably a female.

This species (including the form *lens*) is found scattered over the Ohio drainage in western Pennsylvania. From the Monongahela it is known only from a single locality at Charleroi, Washington County, about 35 miles north of Point Marion

8. *Cyprogenia irrorata* (Lea). 2 double, 4 isolated valves, of medium size.

Not in the Monongahela drainage, and altogether rare in western Pennsylvania; known from the Ohio below Pittsburg and from the Allegheny River in Allegheny and southern Armstrong County. No live specimens have been found recently.

9. *Ptychobranchus phaseolus* (Hildr.). 1 double, 3 isolated valves, of medium size.

Abundant in Cheat River; also in Dunkard Creek. Widely distributed in the Ohio drainage in western Pennsylvania, with exception of the large rivers.

10. *Unio gibbosus* Barn. 4 double, 7 single valves, medium and small size.

Abundant in Cheat River; also in Dunkard Creek. Everywhere in western Pennsylvania.

11. *Unio crassidens* Lam. 7 double, 4 single valves; one above medium size, the others medium and small.

Only in the large rivers; abundant in the Ohio and lower Allegheny. Known from the Monongahela at Charleroi, Washington County, but not farther up. No trace of it in the Cheat.

12. *Pleurobema clava* (Lam.). 2 single valves, medium size.

Present in Cheat River. A rare species in western Pennsylvania, preferring smaller streams.

13. *Quadrula subrotunda* (Lea). 1 double, 5 single valves; medium and small size.

In the Cheat River at present. Also in the Monongahela at Charleroi, Washington County, and in the Ohio and Allegheny Rivers from Beaver to Armstrong Counties. A species of the larger rivers.

We see, that of these thirteen forms one (*Truncilla perplexa cincinnatiensis*) is not present any more in western Pennsylvania, and five (*Truncilla perplexa rangiana, Lampsilis ventricosa ovata, Obovaria circulus, Cyprogenia irrorata, Unio crassidens*) are not found any more in the vicinity of Point Marion (in Cheat River or Dunkard Creek). Of the latter, *Lampsilis ventricosa ovata, Cyprogenia irrorata*, and *Unio crassidens*, are typical inhabitants of the large rivers, and, near Point Marion, possibly once existed only in the Monongahela River, the fauna of which is now destroyed. *Truncilla perplexa* and *Obovaria circulus* may yet turn up in the Cheat River, but, if present at all, must be very rare at the present time. This is the more remarkable, since the two forms of *Truncilla perplexa* were represented, in the garbage heap, by a comparatively great number of individuals.

The small size of all specimens shows that the Indians selected for food only such small specimens, rejecting the big ones.

The chief interest of this little collection lies in the fact that it gives us an idea of what damage has been done to our *Unionidæ-fauna* in recent times. For comparison, I submit here the lists of the species collected by myself in Cheat River and Dunkard Creek.

Cheat River (collections made on Sept. 6, 1904, Sept. 16, 1907, July 10, 1908).

1. *Lampsilis ventricosa* (Bar.).
2. *Lampsilis multiradiata* (Lea).
3. *Lampsilis ligamentina* (Lam.).
4. *Lampsilis recta* (Lam.).
5. *Lampsilis iris* (Lea).
6. *Ptychobranchus phaseolus* (Hildr.).
7. *Strophitus undulatus* (Say).
8. *Symphynota costata* (Raf.).
9. *Alasmidonta marginata* (Say).
10. *Unio gibbosus* (Barn.).
11. *Pleurobema clava* (Lam.).
12. *Quadrula undulata* (Barn.).
13. *Quadrula pustulosa* (Lea).
14. *Quadrula subrotunda* (Lea).
15. *Quadrula tuberculata* (Raf.).

The leading species is *Unio gibbosus* (30 per cent.); then follow: *Lampsilis recta* (20 per cent.) and *Ptychobranchus phaseolus* (20 per cent.). The rest (12 species) makes up the remaining 30 per cent. The scarcity of *Lampsilis ligamentina* is remarkable, since this species usually is the leading species in our rivers. Probably, this locality

is near the limit of the range of this species, and the latter does not go much farther up stream. All of the species are rather small, which is most striking in *Lampsilis recta*, which actually is represented by a dwarf race.

All the species have been found alive, except *Quadrula undulata*.

DUNKARD CREEK (collections made on July 8 and 9, 1908).

1. *Lampsilis ventricosa* (Barn.).
2. *Lampsilis luteola* (Lam.).
3. *Lampsilis recta* (Lam.).
4. *Lampsilis iris* (Lea).
5. *Proptera alata* (Say).
6. *Tritogonia tuberculata* (Barn.).
7. *Ptychobranchus phaseolus* (Hildr.).
8. *Strophitus undulatus* (Say).
9. *Anodonta grandis* (Say).
10. *Symphynota costata* (Raf.).
11. *Unio gibbosus* (Barn.).
12. *Quadrula rubiginosa* (Lea).
13. *Quadrula tuberculata* (Raf.).

Of these, only *Lampsilis luteola* and *Anodonta grandis* were found alive: the condition of the creek was not favorable for collecting (first and second day after a heavy thundershower). It is probable, that the fauna is not complete, and I cannot say anything about the frequency of the single species.

VARIATION.

BY REV. HENRY W. WINKLEY.

First, nature never makes two individuals exactly alike; secondly environment. One hundred shells of the same species from a given locality will show individuality. Compared with a group of the same species from another region there is another difference. Like the difference between races of the human family, this is undoubtedly due to environment. At Eastport, Maine, where the Bay of Fundy tides create strong currents, chitons, limpets and other forms are in profusion and attain unusually large size. These may be called sedentary forms and depend on food being brought to them. A few feet away Buccinum is abundant but small. The same is true of *Lunatia heros* found in neighboring waters. These are carnivorous forms and are much larger at Casco Bay and its neighborhood.

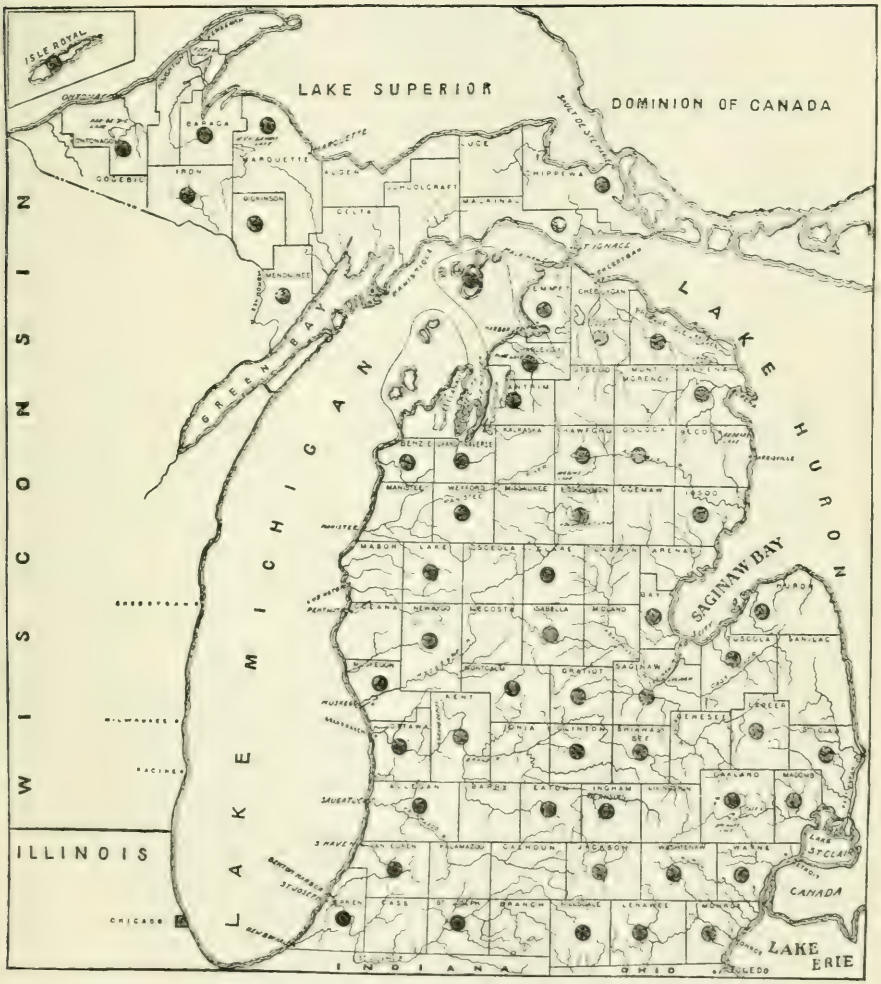
Haminea solitaria is a white shell. A small colony from the

Branford River has every individual a deep brown. I wonder if this is due to the presence of a large iron foundry a short distance away. Erosion is not a characteristic, yet it does result from environment. This is conspicuous where unios are taken from waters where there is decaying vegetation. The reason is well known; acid from decaying leaves acts on the lime of the shell. The same effect may be seen in marine shells taken from waters where a river meets the sea. An interesting effect of air may be seen in the author's cabinet. Shells of *Fusus decemcostatus* taken below low tide are well preserved even to the apex; others from a few yards away, exposed to the air at low tide, are much eroded.

Pure white sets of *Gemma gemma* may be found at Woods Hole and Branford, Conn. At Provincetown they are a very dark purple, some specimens showing hardly a trace of white. At Revere Beach the type is white with perhaps a third of the shell faintly tinted purple. Reasons for this variation I cannot give. Nor can I explain why sets found a dozen years ago at Revere Beach should vary from specimens obtained at the same spot a year ago.

Litorinella minuta is abundant in pot holes in the marshes. Environment there is good for it. A dwarfed variety is found in the Branford River, and the same form occurs on dead eel grass under the wharves at Provincetown. Evidently this form flourishes better in still water. Temperature has its influence. *Planorbis trivolvis* occurs throughout New England. It is small in the Connecticut River at Springfield, the same at Branford and eastern Massachusetts. In northern Maine large, and the largest and finest set in the author's cabinet was obtained at Dalton, Mass., in the Berkshire hills. This last region is well known as having northern insects, undoubtedly the other species of shells would show affinity with the forms in northern New England. Climate alone explains this variation. The forms from the Connecticut River certainly have water enough, but they are small. Other sets are from small bodies of water; only in colder regions does this giant thrive.

Environment drives out some species and retains others. These few examples are variations in the same species which shows the effects of different surroundings.



DISTRIBUTION OF PLANORBIS BICARINATUS IN MICHIGAN.

THE NAUTILUS.

VOL. XXIII. JUNE, 1909. No. 2.

SOME OBSERVATIONS AND NOTES ON MUSCULIUM.

BY V. STERKI.

Most or all of our species of *Musculium* Link (*Calyculina* Clessin) are very variable. *E. g.*, of *M. securis* Pr. there are almost endless forms, some of them so different from others that they appear to be distinct species, even of different groups. They readily respond to the nature of their habitats, and almost every place has its own peculiar forms. It may be added that most of them are inhabitants of quiet waters: small lakes, ponds, pools, marshes, ditches, slow streams; but *M. transversum* Say is also found in rivers with strong current, with stony and rocky bottoms.

Years ago Clessin stated his belief that they are comparatively short-lived and of cyclical development, annuals. The first part of his statement is probably correct, the latter probably not, or not for all species; specimens at all stages of growth, from newly hatched to full-grown, can be found at any time of the year. Yet under certain conditions their development appears to be uniform; *e. g.*, where pools dry up in fall, only the young mussels appear to survive, to grow to maturity and propagate during spring and summer.

These mussels are described as having their beaks calyculate, or "capped," and the genus has been established mainly on that feature.[1] But in most and probably in all species, specimens and forms are found with slightly or non-calyculate beaks, and such are the rule

[1] Yet even without that supposed but mistaken character the genus appears to be well founded, as will be shown elsewhere.

rather than the exception in *M. transversum* Say. By the way, it may be said that calyculate beaks are found occasionally in specimens of *Pisidium* and *Sphærium*.

The nepionic (embryonic) mussel when discharged from the parent is generally well inflated (except in *M. transversum*), and then the postembryonal part of each valve is marked off from it by a constriction more or less deep. This seems to be especially well marked when the embryos have been retained by the parent for a long time, *e. g.*, over winter, and are overgrown, as it were.[1] Under favorable conditions the embryos are probably discharged as soon as sufficiently developed, moderately inflated, and then postembryonal growth goes on in the same direction without or with a slight demarcation line.

There are in my collection a number of lots of a *Musculium*, different from all other species described and known, from Rhode Island, Virginia, Ohio, Michigan, and remarkably alike. The mussels are somewhat like medium-sized *M. securis* Pr., but more elongate, moderately and evenly inflated; the anterior and posterior parts are less disproportionate, the latter is less high, less and more obliquely truncate, the beaks are not calyculate, rounded, comparatively broad and not very prominent; even under the microscope, no demarcation line between the embryonal and postembryonal parts can be seen; the surface is markedly regular, without or with slight lines of growth, with very fine striæ and a slight silky gloss; the color is dark horn, not yellowish, somewhat lighter along the margins, but there are no sharply defined zones, as common in *securis*. Isolated, this *Musculium* would appear to represent a distinct species; but younger specimens, evidently of the same form, have more the outlines of *M. securis*, and in every lot there are some specimens of the same, with the beaks calyculate, and generally there are intermediate ones, as to outlines and general appearance. Several of the lots were collected in fall, from September to November, and others probably so. It appears probable that this is a summer form of *M. securis*, of fast and steady growth under favorable conditions, consequently not a variety. Corresponding forms of other species have also been seen. If verified by future observations, this is a remarkable and very interesting fact.

Also the varieties and local forms of all species, and the conditions

[1] Under the microscope such specimens show several concentric zones along the margins of the valves, marked by lines of growth.

under which they grow, should be carefully studied. In order to do this much more good material is needed from all over the continent. It is very desirable to collect repeatedly, throughout the year, at favorable places, wherever there is an opportunity for doing so; it is essential to have the date of collecting with every lot, notes on the nature of the habitat, and last but not least, to have good numbers of specimens, not only the large ones, but also the half-grown and young. Any material, from anywhere, will mean a contribution to our knowledge.

It may be added that the simplest and best means for collecting small fresh-water mollusca, Sphæriidæ and gastropods, is a sack net of good burlap on a frame of strong wire ($\frac{1}{5}$–$\frac{1}{4}$ inch), the ring of about 6–8 inches diam., tied to a handle of suitable length, *e. g.*, a broomstick. In this net mud and other material, scooped up from the surface of the bottom, is washed, the coarser things gradually removed; the remainder is taken home and dried well, but not in too great heat. Then, a small sieve, *e. g.*, a strainer, or several of different mesh measures, are very serviceable for separating finer and coarser material, and it will be much easier to pick out the specimens, of which the smallest should not be overlooked; some *Pisidium* are not larger than 1 to 2 mm. when mature. Specimens to be sent for examination are best left mixed up, or separated only for considerable differences of size. The washings and specimens must be handled carefully, especially *Musculium*, since most of them are very fragile. The whole "stuff," dirt and all, fresh or dried, may be sent for examination, after the coarser materials are removed.

For deep water a drag-net or small dredge of burlap will do good service, especially if protected by an outer sack of strong canvas with the bottom left open. It is very desirable that collecting be done in lakes and deep rivers.

DESCRIPTION OF A NEW FOSSIL LYMNÆA.

BY F. C. BAKER.

LYMNÆA NASHOTAHENSIS n. sp.

Shell elongated, somewhat pyramidal; surface dull, growth-lines conspicuous, crossed by fine, impressed spiral lines; whorls 6–6½, rather rapidly increasing in diameter, flatly rounded, the body whorl very large and quite convex or even gibbous; spire broadly pyramidal or conic, longer than the aperture; sutures well marked; aperture

long, ovate, much narrowed above, generally wide and flaring below; outer lip with variceal thickening; inner lip rather broad, reflected over the umbilical region, forming a conspicuous expansion and leaving a well-marked umbilical chink; parietal callus wide and rather thick, in some specimens rendering the aperture continuous; axis twisted; the columella is plicate in the immature shell, but in adult or old specimens the inner lip is raised over the umbilicus, somewhat as in *emarginata*.

Length 33.50, breadth 13.00; aperture length 14.00, breadth 7.00 mm.

Length 29.00, breadth 13.00; aperture length 15.00, breadth 6.75 mm.

Length 28.75, breadth 13.50; aperture length 15.75, breadth 7.00 mm.

Length 25.00, breadth 12.00; aperture length 14.00, breadth 7.25 mm.

Length 21.00, breadth 10.00; aperture length 12.00, breadth 6.00 mm.

Length 24.00, breadth 10.00; aperture length 11.00, breadth 5.00 mm.

Length 18.25, breadth 8.25; aperture length 10.00, breadth 4.25 mm.

Types: The Chicago Academy of Sciences, 9 specimens, No. 24539; cotypes, Academy of Natural Sciences, Philadelphia, No. 98521, 6 specimens.

Type locality: Marl beds, Nashotah, Waukeshaw County, Wisconsin.

Remarks: *L. nashotahensis* was at first thought to be a form of *Lymnæa danielsi*; it differs markedly from that species, however, in several particulars—the spire is broader and not so acute, the body whorl is larger and inclined to be gibbous, there is a conspicuous umbilical chink (*danielsi* is usually imperforate), and the columella is not noticeably plicate. In *nashotahensis* the aperture is elongate ovate, narrowed above and broadened below, where it is often patulous. The upper whorls are strongly suggestive of *Lymnæa reflexa*, the penultimate whorl having the swollen appearance so characteristic of *reflexa*.

Young specimens somewhat resemble *Lymnæa catascopium*, differing in being narrower, with a more elongate aperture, longer and less

rounded whorls and a less distinctly plicate columella. There is also an umbilical chink, which is usually absent in *catascopium*.

Like Walker's *Lymnæa bakeri* from Michigan, *nashotahensis* is apparently an extinct species peculiar to marl deposits. The specimens were secured by Mr. F. M. Woodruff.

NOTES ON PLANORBIS II: P. BICARINATUS.

BY BRYANT WALKER.

(Concluded from May Number.)

IX. Miscellaneous.

In Beck's Index Moll. (1837), p. 118, the following synonymy of this species is given:

"*Planorbis bicarinatus* Say. Am. Septr. C. C.

a. major. S. g. iv, 4. W. S. vii, 12. Fl. Schuylkill.
Pl. angulatus Wood.

b. minor.
an *P. eburneus* Ch. ix, 1123? New Jersey."

P. angulatus Wood, Index Testaceologicus, edit. II, 1828, Suppl., pl. 7, f. 12, is a typical *P. bicarinatus*. The figures in Sowerby's Genera, referred to by Beck (as "S. g.") are the same species.

Beck defined his *minor* only by a queried reference to Chemnitz's figures of a West Indian species, really entirely different.

Distribution.

The recorded distribution of *Planorbis bicarinatus* is shown with approximate exactness upon the accompanying map (pl. III). These data are primarily based upon the collection of the Philadelphia Academy, the complete list of which has been kindly furnished by Dr. Pilsbry. To these have been added such additional information as was afforded by my own collection. The localities thus vouched for are indicated on the map by the black dots. These data have been supplemented by such specific localities as a careful search of the literature at my command afforded. These citations are represented by the outlined dots. Duplicate citations and those giving simply the "State" have been omitted. A detailed list of all localities and the authorities for the same is given below. The map does

not extend far enough north to allow the localities in Keewatin, Canada, to be plotted.

While the exhibit as a whole affords what is probably a fairly accurate view of the actual distribution, yet it also shows how lamentably small our knowledge really is of the range of one of our most common species, and how much still remains to be done before any generalization can be other than tentative. Still the chart is of interest as showing what we do know, and serves to indicate the regions to which attention of American collectors should be particularly directed. Thus the apparent absence of the species from the entire littoral Atlantic region (with the exception of a single record from Wilmington, N. C.) from the Potomac to Florida, and along the coastal region of the Gulf from Florida to Texas is very striking and worthy of investigation. So, too, the exact range towards the west is important and of considerable scientific interest. No doubt many of the deficiencies of the present map can be supplied from material already accumulated in the many private collections of the country, and it is hoped that this review of the subject will induce the publication of all such information for the benefit of those interested in the geographical distribution of the American fauna. For it is only by the accumulation of detailed information, such as is afforded by the publication of carefully authenticated local lists, accompanied by exact localities, that any substantial advance can be expected.

Taking the chart, such as it is, certain facts can be deduced with a great degree of certainty, while others must still remain more or less tinged with uncertainty until more exact knowledge shall either prove or disprove them. On the north it seems reasonably certain that *bicarinatus* extends through British America from Anticosti, New Brunswick and Nova Scotia west to at least Lake Winnipeg and Manitoba and north to Keewatin. In all probability it may be found to range west through Saskatchewan and Assiniboia well toward the Rocky Mountains.

The data already accumulated shows a distribution through the northern United States from Maine to Oregon. The northwestern data, though scant, tend to show that the invasion of the valley of the Columbia was through transfer from the headwaters of the Missouri or its tributaries to the Snake, Pend Oreille or other tributaries of the Columbia.

The accuracy of that veteran collector, Henry Hemphill, as to its occurrence at Antioch, California, quoted by Stearns (1881), is not to be questioned. But the fact that there is no other record of its occurrence in California certainly tends to show that the Antioch find was a sporadic colony, accidentally introduced, and which never succeeded in effecting a permanent foothold.

The citation of this species from the Yaqui River, Guaymas, Mexico, on the Gulf of California, by Stearns (1889), where it is said to have been collected by Palmer, is open to more doubt. It appears that *Polygyra hirsuta* was also alleged to have been collected at the same time and place. The nearest authentic locality for this species is southwestern Missouri. There is no evidence that *bicarinatus* has ever been discovered anywhere in the Colorado basin. The occurrence of two common eastern species at the same time in a locality so remote from the known range of either is certainly very remarkable, and would naturally raise a question as to whether there had not been an accidental mixing of specimens. *Bicarinatus* is not quoted from Mexico at all by Crosse and Fischer, and its occurrence at Guaymas is very improbable.

Leaving these two doubtful citations out of the question, the only authentic occurrence of *bicarinatus* on the Pacific coast is along the Columbia in Oregon; south of that the Rocky Mountains, no doubt, mark the western range of the species.

In the Potomac River at and below Washington, D. C., *bicarinatus* is an abundant species. South of that, with the exception of Wilmington, N. C., so far as the records show, it is absent from the entire coastal Atlantic region. In western North Carolina and northwestern Georgia it is found in streams belonging to the western drainage. We have no records from South Carolina and Florida. The large amount of collecting that has been done in various parts of the latter state goes to show that it does not occur there. South Carolina is practically unknown conchologically. It was not found by Henderson at Yemasee, Beaufort Co. (NAUT. XXI, p. 7). Mr. Wm. G. Mazyck, of Charleston, S. C., informs me that he has never known of its occurrence in that state, and that it is not quoted in either of Ravenel's Catalogues of 1834 or 1874. In Alabama, though not abundant, it occurs in the northern part of the state, and extends in the Alabama drainage as far south at least as Pinehill, Wilcox Co. There are no records for either Mississippi or Louisiana.

In Texas it is an abundant species, at times, in the central eastern part of the state, and no doubt ranges north from there. But there are no records from the valley of the Rio Grande and, as stated before, none from Mexico. This river would therefore seem beyond the southwestern range of the species.

So far as the records show, it is apparently absent from the entire coastal region on the Gulf.

Since the above was written and the map (Plate III) was prepared, Mr. H. H. Smith has collected typical *bicarinatus* in Beaver Creek, Conecuh Co., Ala. This "find" not only carries the species further south than previously recorded, but brings it into the western extension of the Atlantic fauna area along the Gulf Coast. Beaver Creek is a tributary of Murder Creek, which forms part of the Escambia River drainage system.

West of the Appalachian Mountains, *bicarinatus* is, in suitable localities, a common species in all the states as far west as Kansas and Colorado, and there is no great doubt but that it ranges, in suitable environment, west to the mountains. But the data at hand are too few and too scattering to give any exact information as to the limits of the western range. They are indicated on the map and given in detail in the following list:

Distributional Data.

United States.

Alabama: Big Willis Creek, Atalla; Coosa River, Minnesota Bend; Black Warrior River, Jefferson Co.; Cub Creek, Pinehill; Princeton (Walker); Beech Creek, Selma; Cahawba River (Lewis); Coosa River, Farmer (Hinkley).

Arizona: None.

Colorado: Boulder (Pils.); Lodge Pole Creek, Logan Co.; Owens Lake, Boulder; Weld Co.; Greely (Henderson).

Connecticut: West Granby, Hartford Co. (Pils.).

Arkansas: White River, Carroll; Big Creek, Sebastian; Ouachita River, Hot Spring (Sampson).

Delaware: Brandywine River, between Dupont's and Rockland (Pils.).

District of Columbia: Washington (Pils.).

Florida: None.

Georgia: East Rome (Pils.); Silver Creek, East Rome; Armuchee Creek, Rome; Dalton (Walker).

Idaho: Old Mission (Pils.); Blue Creek, Cœur d'Alene Mountains; Cedar Creek, Priest Lake (Walker).

Illinois: Athens; Rock Island (Pils.); Joliet (Ferriss MSS.); Cook Co.; LaSalle Co.; Des Plaines River; Kappa, Panala, Woodford Co.; Crystal and Silver Lakes and Algonquin, McHenry Co.; Mercer Co.; Elgin, Kane Co.; Illinois River and Dogfish, Quiver and Matanzas Lakes, Havana, Mason Co.; Fourth, Sand, Cedar, Fox, Pistakee, Clear, Long and Slough Lakes, Lake Co.; Pope Co.; Johnson Co.; Thompson's Lake, Fulton Co.; Milan, Rock Island Co.; Pekin, Tazewell Co. (Baker).

Indian Territory: Tushkahama (Ferriss, MSS.).

Indiana: Randolph Co. (Pils.); Cedar Lake; Bass Lake, Stark Co. (Baker); Connorsville, Danville (Walker); Richmond, Wayne Co. (Plummer); Indianapolis, Whitewater Basin, West Whitewater Basin, Maumee Basin, St. Joseph Basin, Lake Michigan Basin (Call), Franklin Co. (Moore and Butler); Lake Michigan, Michigan City; Lake James, Steuben Co.; Clear Lake, LaPorte Co. (Daniels).

Iowa: Iowa City; DeWitt; Clear Lake; Davenport (Pils.), Muscatine, Des Moines, Ruthven (Walker); Spirit Lake (Keyes).

Kansas: Walnut Creek (Pils.); Topeka; Ellis; Soldier Creek, Silver Lake Twp., Shawnee Co.; Northern Wabaunsee Co.; Brown Co.; Cedar Creek, Mt. Ida; Barber Co.; McDowell Creek, Riley Co.; Kansas River, Wyandotte; Neosho Co. (Call).

Kentucky: Bowling Green (Pils.).

Louisiana: None.

Maine: Caribou, Aroostook Co.; Rockland, Knox Co. (Pils.); Orono, Fort Kent, St. John's River; Gelot's Lake, New Sweden; Second Lake, Fish River; Salmon Brook, Aroostook River; Woodland, Collins' Mill Pond, Portage Lake, Square Lake, Aroostook Co.; E Warren; Rockville (Walker); Cross Lake Inlet; Cross Lake; Moose River, Somerset Co. (Nylander); Moosehead Lake (Johnson); Portland (Pickering).

Maryland: Cumberland; Hancock; Chestertown, Kent Co.; Flintstone, Allegheny Co.; Conecocheque River at National Road (Pils.); Potomac River, Fort Washington (Walker).

Massachusetts: Pontoosuc Lake, W. Mass. (Pils.); Cambridge; Amherst (Walker); Fresh Pond (Adams); Swampscot, Lynn and vicinity (Tufts); Stockbridge (Ferriss, MSS.); Bristol Co. (Taylor and Shiverick).

Michigan: The writer has records from 52 of the 83 counties of the state, indicating a general distribution throughout the state. The counties represented are shown by the map (plate II).

Minnesota: Lake Albert Lea; Fergus Falls (Pils.); Stearns Co.; Lake Minnetonka; Cannon Lake, Rice Co.; Shackleton Lake (Walker); Minneapolis; Lake Minnewaska, Pope Co.; Vermilion Lake, Winona, Lake Co.; St. Louis Co. (Grant); Clearwater, Wright Co. (Sargent); Harriet Lake, Hennipen Co. (Daniels); Heron Lake, Jackson Co.; Eagle Lake, Sherburne Co. (Stearns).

Mississippi: None.

Missouri: Pettis Co.; Lamar, Barton Co. (Sampson).

Montana: Mingusville, now Wibaux (Squyer).

Nebraska: Sidney (Walker); streams of eastern Neb. (Aughey); Omaha (Tryon).

Nevada: None.

New Hampshire: Profile Lake (Walker); Keene (Walker and Coolidge).

New Jersey: Greenwood Lake, Passaic Co.; Raritan River; Cedar Lake, White Pond, Warren Co.; Swartzwood Lake, Sussex Co.; Center Twp., Camden Co.; Delaware Water Gap; Princeton, Mercer Co.; Lake Hopatcong, Budd's Lake, Morris Co.; Hackensack Valley; Closter, Bergen Co.; Trenton; Gloucester Co. (Pils.).

New Mexico: Las Vegas; South Spring River, Roseville; Trementina; Santa Fe; Arroyo Pecos, Las Vegas (Pils.).

New York: Cazenovia; Skaneatales Lake; Long Island; Niagara; Hudson River, Fort Warren, Ridgewood; Racquette Lake, Hamilton Co.; Queens Co.; Squaw Island, Niagara River; Troy (Pils.); Gannagagee Creek, Erie Co.; Alfred; Watertown; Canandarago Lake, Otsego Co.; Cedar Lake, Herkimer Co.; Old Forge (Walker); Sunset Creek, Otsego Co. (Smith); Chatauqua Lake (Maury); Schuyler's Lake, Otsego Co.; Mohawk River, Little Lakes and Erie Canal and Litchfield, Herkimer Co. (Lewis); Onondaga Co. (Beauchamp); Rochester (Walton); Huntington, Centerport, Long Island (Smith & Prime); Cayuga Lake (Ferriss MSS).

North Carolina: Asheville; Greenfield Pond, Wilmington (Walker).

North Dakota; Hankinson (Pils.); Fort Stevenson (Stearns).

Ohio: Columbus; Geanga Co. (Pils.); Hudson (Walker); Cincinnati (Harper and Wetherby); Tuscawaras Co. (Sterki); "The Reserve" (Naturalist).

Oklahoma: Oklahoma City (Ferriss); Cimmaron River (Call).

Oregon: Willamette River; Salem; Portland (Pils.).

Pennsylvania: Delaware River (type locality), Say; Allegheny River; Round Island, Clinton Co.; Port Allegheny, McLean Co.; Youghiougheny River, Connellsville, Fayette Co.; Juniata River, Hollidaysburg, Blair Co.; Susquehanna River, Muncy; Cushclishia Creek, Indiana Co.; Emporium, Cameron Co.; Amity Twp., Berks Co.; Beaver River, Waupum, Montgomery Co.; Germantown and various localities, Philadelphia Co.; Nockamixon, Bucks Co.; Schanksville, Somerset Co.; Glenolden, Delaware Co.; Gettysburg; Ligonier, Westmoreland Co., York Furnace, York Co. (Pils.); Allegheny Co. (Stupakoff); Ohio River, Coraopolis (Rhoads); Chester Co. (Hartman & Michener); Lancaster Co. (Haldeman); Columbia; Susquehanna River, Wilkesbarre (Walker).

Rhode Island: Providence and Worcester Canal; Cunliff's Pond (Carpenter).

South Carolina: None.

South Dakota: Mouth of Big Sioux River (Lea).

Tennessee: Emory River and Harriman (Pils.); Chilhowee Mts., Blount Co.; Franklin Co. (Walker); Tellico River, Blount Co. (Lewis); Little River (Ferriss MSS).

Texas: New Braunfels (Pils.); San Antonio (Walker); Pedernales River, Gillespie Co.; Brushy Creek, Williamson Co.; Colorado River and tributaries, Comal Co.; San Marcus River, Hayes Co.; Colorado River and tributaries, Travis Co.; Burton, Washington Co. (Singley); Hog Creek, McLennan Co. (Strecker).

Utah: None.

Vermont: Connecticut River, Hartland (Pils.); Middlebury (A ms)

Virginia: Luray (Pils.); Orange (Walker); Harper's Ferry (Tryon).

Washington: Cascades, Skamania Co. (Pils.).

Wisconsin: Milwaukee (Pils.); Menominee River; Wauwatosa; Honey Creek, Layton Park; Kinnickinnic River, Milwaukee; Golden Lake, Waukesha Co.; Little Cedar Lake, Washington Co.; Lake Winnebago, Calumet Co.; Kenosha (Chadwick).

West Virginia: Four miles from Romney; Kanawha River, forty miles south of Ohio River, Wirt Co.; North River, Sedan, Hampshire Co.; Warm Spring Creek, Morgan Co.; Salt Sulphur Spring,

Monroe Co.; Patterson's Creek, Mineral Co.; Potomac River, Cherry Run (Pils.); Potomac River, Harper's Ferry (Walker).

Wyoming: Yellowstone National Park (Stearns).

Dominion of Canada—Quebec: Meaches Lake, Hull; Chaudiere River; Chelsea (Pils.); Caprouge (Walker); Anticosti (Latchford); Brome Lake, Knowlton (Whiteaves MSS).

Ontario: Sparrow Lake, Simcoe District; Puzzle Lake, 40 miles north of Napanee; Rideau River; Ottawa River (Pils); Little River, Walkerville (Walker); Lake Simcoe (Stearns).

Algoma: Dog River, north shore Lake Superior; Gores Bay, Manitoulin Island, Lake Huron (Walker); Moose Factory, Hudson Bay (Dall).

Manitoba: Lake Winnipeg; Lake Manitoba (Christy).

Nova Scotia: Dartmouth Lakes (Jones).

Keewatin: Lake St. Joseph; Kawinogans River, Albany River. Knee Lake (Whiteaves); Saskatchewan River, Grand Rapids (Dall.);

New Brunswick: Kennebecasis River and elsewhere (Matthew and Stead).

Mexico: Yaqui River, Guaymas, W. Mexico (Stearns). See p.

Bibliography.

The following list includes all papers cited as authority for distribution in the preceding part of this paper. It is no doubt imperfect, as it embraces only such literature as has been accessible to the writer. For the sake of brevity many other papers examined, which afforded only duplicate records or simply a general "State" record are omitted:

Adams, C. B.—Shells of Fresh Pond. (Am. J. Sci. and Arts, O. S. XXXVI, p. 392, 1839.)

Adams, C. B.—Catalogue of the Mollusca of Middlebury, Vermont, and vicinity. (Am. J. Sci. and Arts, O. S. XI, p. 269, 1841.)

Aughey, Samuel.—Catalogue of the Land and Fresh-water Shells of Nebraska. (Bull. U. S. Geol. Survey III, p. 701, 1877.)

Baker, F. C.—The Mollusks of Cedar Lake, Indiana. (Naut. XVII, p. 113, 1904.)

Baker, F. C.—A Catalogue of the Mollusca of Illinois. (Bull. Ill. St. Lab. Nat. Hist. VII, p. 106, 1906).

Beauchamp, W. M.—Land and Fresh-water Shells of Onondaga County and State of New York (1886).

Call, R. E.—A Contribution to a Knowledge of Indiana Mollusca. (Proc. Ind. Acad. Sci. III, p. 150, 1894.)

Call, R. E.—The Hydrographic Basins of Indiana and their Molluscan Fauna. (Proc. Ind. Acad. Sci., 1896, p. 250.)

Call, R. E.—Contributions to a Knowledge of the Fresh-water Mollusca of Kansas. No. II, p. 54; No. IV, p. 123; No. V, p. 184; No. VI, p. 16.

Carpenter, H. F.—The Shell-bearing Mollusca of Rhode Island. (Random Notes on Nat. Hist. II, p. 96, 1886.)

Chadwick, G. H.—Notes on Wisconsin Mollusca. (Bull. Wis. Nat. Hist. Soc. IV, p. 83, 1906.)

Chickering, J. W., Jr.—List of Marine, Fresh-water and Land Shells found in the vicinity of Portland, Maine (1855 or 6?.)

Christy, R. M.—Notes on the Land and Fresh-water Mollusks of Manitoba. (J. of Con. IV, p. 248, 1885.)

Dall, W. H.—Land and Fresh-water Mollusks of Alaska. (Rep. Har. Alaska Exp. XIII, p. 87, 1905.)

Daniels, L. E.—A check list of Indiana Mollusca. (Rep. Dept. Geol. & Nat. Resources, Ind. 1902, p. 637.)

Daniels, L. E.—Records of Minnesota Mollusks. (Naut. XXII, p. 119, 1909.)

Ferriss, J. H.—Mollusks of Oklahoma. (Naut. XX, p. 17, 1906.)

Grant, U. S.—Conchological Notes. (14th Ann. Rep. Geol. & Nat. Hist. Survey of Minn., p. 122, 1885.)

Grant, U. S.—Notes on the Molluscan Fauna of Minnesota. (16th Ann. Rep. Geol. & Nat. Hist. Survey of Minn., p. 484, 1887.)

Haldeman, S. S.—Mollusca. (Rupp's Hist. Lancaster Co., Pa., p. 481, 1844.)

Harper, G. W., & Wetherby, A. G.—Catalogue of the Land and Fresh-water Mollusca found in the immediate vicinity of Cincinnati, Ohio, 1876.

Hartmann, W. D., & Michener, E.—Conchologia Cestrica, p. 70, 1874.

Henderson, Julius.—The Mollusca of Colorado. (University of Colo. Studies IV, p. 181, 1907.)

Hinkley, A. A.—List of Alabama Shells collected in October and November, 1903. (Naut. XVIII, p. 54, 1904.)

Johnson, C. W.—Shells of the Lake Region of Maine. (Naut. XXI, p. 106, 1908.)

Jones, J. M.—List of the Mollusca of Nova Scotia, 1877.

Keyes, C. R.—An Annotated Catalogue of the Mollusca of Iowa. (Bull. Essex Inst. XX, p. 13, 1889.)

Latchford, F. R.—Shells of Anticosti. (Am. Nat. XVIII, p. 1052, 1884.)

Lea, Isaac.—Report on Mollusca. (Explorations in Nebraska, Executive Doc. II, p. 72, 1859.)

Lewis, James.—Shells of Herkimer and adjacent counties in the State of New York. Proc. A. N. S., Phila., 1872, pp. 97–107.

Lewis, James.—Shells of Tennessee, No. 2. (Proc. P. A. N. S., 1872, p. 108.)

Lewis, James.—Fresh-water and Land Shells of Alabama, 1876.

Linsley, J. H.—Catalogue of the Shells of Connecticut. (Am. J. Sci. & Arts O. S. XLVIII, p. 281, 1845.)

Matthew, W. D., & Stead, G.—Land and Fresh-water Shells collected near St. John, N. B. (Proc. Miramichi Nat. Hist. Ass., No. III, p. 49.)

Maury, C. J.—Chatauqua Lake Shells. (Element. Nat. Hist. Series, No. I, p. 26, 1898.)

Moore, D. R., & Butler, A. W.—Land and Fresh-water Mollusca observed in Franklin County, Indiana. (Bull. Brookville Soc. Nat. Hist., No. I, p. 43, 1885.)

Naturalist.—Miscellaneous Observations, etc. (Am. J. Sci. & Arts O. S. XXXI, p. 36, 1837.)

Nylander, O. O.—Fresh-water Shells in the northeast of Maine. (Naut. XI, pp. 9–12, 1897.)

Plummer, J. T.—Scraps in Natural History. (Am. J. Sci. & Arts O. S. XLVIII, p. 95, 1844.)

Rhoads, S. N.—On a Recent Collection of Pennsylvania Mollusks from the Ohio River System below Pittsburg. (Naut. XII, p. 138, 1899.)

Rhoads, S. N.—A Glimpse at the Shell Fauna of Delaware. (Naut. XVIII, p. 66, 1904.)

Sampson, F. A.—Notes on the Distribution of Shells. (Kansas City Rec. of Sci. VI, p. 22.)

Sampson, F. A.—The Shells of Pettis County, Missouri, (Bull. No. 1, Sedalia Nat. Hist. Soc., p. 10, 1885.)

Sampson, F. A.—A Preliminary List of the Mollusca of Arkansas. (Ann. Rep. Geol. Sur. of Ark. II, p. 186, 1893.)

Sargent, H. E.—Annotated List of the Mollusca found in the vicinity of Clearwater, Wright Co., Minn. (Naut. IX, p. 127, 1896.)

Say, Thomas.—Nich. Encyc., 1st Ed., 1817.

Singley, J. A.—Texas Mollusca. (4th Ann. Rep. Geol. Survey of Texas, p. 314, 1892.)

Smith, Maxwell.—Shells of Richfield Springs, N. Y., and vicinity. (Naut. XX, p. 91, 1906.)

Smith, S., & Prime, T.—Report on the Mollusca of Long Island, N. Y., and its dependencies. (Ann. N. Y. Lyc. Nat. Hist. IX, p. 402, 1870.)

Squyer, Homer.—List of Shells from the vicinity of Mingusville, Montana. (Naut. VIII, p. 64, 1894.)

Stearns, R. E. C.—Observations on *Planorbis*. (Proc. P. A. N. S., 1881, p. 101.)

Stearns, R. E. C.—Notes and Comments on the Distribution of *Planorbis* (*Helisosma*) *bicarinatus*. (West. Am. Scientist, 1889, p. 110.)

Stearns, R. E. C.—List of Shells collected by Vernon Bailey in Heron and Eagle Lakes, Minn. (Proc. U. S. Nat. Mus. XXII, pp. 135–8.)

Sterki, V.—List of the Land and Fresh-water Mollusca of Tuscawarus County, Ohio. (18th Ann. Rep. Ohio St. Acad. Sci., p. 6.)

Strecker, J. K., Jr.—The Mollusca of McLennan County, Texas. (Naut. XXII, p. 65, 1908.)

Stupakoff, S. H.—Land and Fresh-water Shells of Allegheny County, Pa. (Naut. VII, p. 135, 1894.)

Taylor and Shiverick.—Catalogue of Shells found in and near the County of Bristol, Mass., 1840?.

Tryon, G. W., Jr.—Notes on Mollusca collected by Dr. F. V. Hayden in Nebraska. (Am. J. of Con. IV, p. 151, 1868.)

Tufts, Samuel, Jr.—A List of Shells collected at Swampscot, Lynn and vicinity. (Proc. Essex Inst. I, p. 30, 1856.)

Walton, John.—The Mollusca of Monroe County, N. Y. (Proc. Rochester Acad. Sci. II, p. 13, 1892.)

Walker, R. D., & Coolidge, W. H., Jr.—Mollusca of Keene, New Hampshire. (Naut. XXII, p. 32, 1908.)

Whiteaves, J. F.—List of Land and Fresh-water Shells from the District of Keewatin. (Rep. Geol. Surv. of Canada, 1905, p. 6.)

Whiteaves, J. F.—List of some Fresh-water Shells from Northwestern Ontario and Keewatin. (Ottawa Nat. XX, pp. 31–2, 1906.)

Explanation of Plate I.

All the figures are x 2, except Fig. 10, which is x 3.

Fig. 1. *P. bicarinatus aroostookensis* Pils. Collins' Mill Pond, Me.

Fig. 2. *P. bicarinatus aroostookensis* (topotype). Salmon Brook, Me.

Fig. 3. *P. bicarinatus* Say (typical). Delaware River, Phillipsburg, N. J.

Figs. 4 and 5. *P. bicarinatus angistomus* Hald. Independence Lake, Washtenaw Co., Mich.

Figs. 6–8. *P. bicarinatus unicarinatus* Hald (type). Schuylkill River, Pa.

Fig. 9. *P. bicarinatus portagensis* Baker (cotype). Portage Lake, Me.

Fig. 10. *P. bicarinatus corrugatus* Currier (type). Perch Lake, Kent Co., Mich.

Fig. 11. *P. bicarinatus royalensis* Walker (type). Siskowit Lake, Isle Royale, Mich.

Fig. 12. *P. bicarinatus percarinatus* Walker (type). Crystal Lake, Benzie Co., Mich.

NOTES.

An internal septum in Holospira bartschi.—In a specimen of this snail cut open there is a vertical septum across the cavity at about the middle of the eighth whorl. It is concave on the lower side, as in many *Urocoptidæ*. To abandon the early whorls is very common in Antillean and the larger Mexican forms but has not before been noticed in *Holospira*. The internal column in *H. bartschi* is very nearly one-third the diameter of the shell at the widest part, but it decreases to about one-fourth in the penultimate whorl.—H. A. Pilsbry.

THE NAUTILUS.

VOL. XXIII. JULY, 1909. No. 3.

A SPRING COLLECTING TRIP.

Notes on New England Nudibranchs II.

BY FRANCIS N. BALCH.

In a recent number of the "Nautilus"[1] I recorded two occurrences of nudibranchs at Cohasset, Mass., indicating marked local condensation of the partly grown Eolid population during the time of a supposed autumn migration of the year's brood to deeper waters.

The condensation of adults at the breeding season is of quite a different order and much more familiar. The supposition is that the year's adults migrate from deep water to the shore, there to spend a brief mating season, spawn, and (for the most part) die. It is well known that early spring is the breeding season for most of the species, while others appear to select late autumn or winter—facts which go far to explain our woeful ignorance of this group in this country. At times, in other countries, these mating forms have been found abundant and gregarious to such an extent as to justify the expression "swarming" for the habit.[2]

[1] Vol. xxii, No. 2, June, 1908, pp. 13–16. "Two interesting New England Nudibranch Records." The sub-title "Notes on New England Nudibranchs. I." was accidentally omitted by the printer. P. 15, top line, after word "and" insert "T." For other errata see Nautilus, xxii, No. 6, Oct., 1908, p. 60.

[2] I use the term "swarming" in this paper to indicate a distinct gathering together, in *relatively* great abundance, for breeding.

Eliot ("On some Nudibranchs from East Africa and Zanzibar." Pt. V.; P. Z. S., 1904, ii, p. 87) furnishes a description of such a "swarming" of *Trevelyana crocea*,

From April 26 to 30, 1908, I was able to devote a short vacation exclusively to a minute examination, as exhaustive as time permitted, of the nudibranch life on two short stretches of coast suitable for breeding Eolid nudibranchs. The first was a stretch of granite ledges and piles of broken boulders at Rocky Neck, in Gloucester Harbor; the second a stretch of granite ledges at Brace's Cove, on the outer (eastern) side of Eastern Point, Gloucester, Mass. The localities were quite unlike in biological character, though resembling each other as shore formations. The Rocky Neck locality was bathed by the comparatively warm and still waters of the harbor, thick with larvæ, eggs, spores and organic débris of all kinds. Innumerable small and rather deep pools among the broken boulders, thickly hung and often completely choked with fuci, sheltered abundant animal life, including *Metridium* and hydroids. The Brace's Cove locality was pounded by the eternal surf of the open Atlantic, and the water was noticeably colder and crystal-clear. The pools on the massive ledges were much larger, shallower and more open. Corralines were abundant, hydroids and *Metridium* much fewer.

---

a Polycerid from Zanzibar, as follows: "* * * this form provided a most striking case of the migration of molluscs in flocks to shallow water for the deposition of spawn. But a few specimens were collected before a certain period of a few days' duration, when the sand of Chuaka Bay just below low-tide mark was occupied by astonishing numbers * * *. These were not washed up by accident, but were all actively crawling on the sand among the weeds, etc. Many were *in coitu*, and when placed in basins of sea-water most of the specimens were soon engaged in copulation or the deposition of yellow egg-ribbons. By-and-by the swarm disappeared to some unknown permanent habitat. If this were in the deeper channels of the bay (1 to 2 fathoms deep at low tide) they must have been found there by dredging. As this was not the case it seems most probable that the migrations of these tiny animals extend to and from the deep sea three or more miles away."

One may be permitted to guess that the "unknown permanent habitat" to which "the swarm disappeared" was that bourne from which no traveler returns! Quite probably the form may be found to be strictly annual with little or no overlap of generations, as I believe is the case with various of our own forms. Either the young escape observation till just about the breeding season (possibly making a very sudden and rapid growth at that time which may be marked by a change in food supply) or else, and more probably, the young straggle back to deep water as they grow stronger, but while still small, and, there attaining their growth, make a sudden descent (or ascent!) upon the shore *en masse* at the next call of the breeding impulse.

No temperatures were taken, for on the face of it the temperature was not the controlling factor at that time and place, the same forms and spawn occurring indifferently in shallow, sun-warmed pools pleasant to the hands, and in deep, unsunned crevices at extreme low tide when one's breath condensed in clouds over the numbing water. This is not to say that temperature may not be the controlling factor in the initiation of the migration impulse or even in the actual deposition of spawn, which latter may perhaps always take place at high water when the temperature conditions of the pools would be equalized.

The section worked at Rocky Neck did not exceed 300 yards in length, and at Brace's Cove about 200. Three days were given to the former and one to the latter. Every day-light tide was worked industriously, and attention was wholly concentrated on nudibranchs.

The "census" was as follows:

Coryphella rufibranchialis mananensis (Stimps.),[1] typical, 43 specimens collected and about 30 more seen—total, say 75. All but 6 at Rocky Neck. All well-grown, if not fully adult, except three or four apparently about half-grown.

Coryphella rufibranchialis chocolata var. nov. Externally not separable by me from the foregoing except by the color of the cores of the cerata and of the body, which is a true chocolate-brown, dark for the cerata, light for the body, as contrasted with the varied reds (varying from pink to ginger, salmon and scarlet) of the typical form. The dentition and internal anatomy have not yet been examined, but as there is undoubtedly intergrading in the color, no very distinctive character should be anticipated. I have seen this form before, but never more than one or two specimens at a time. As a mere color variety (and for all we actually know, a mere physiological phase) it may be thought not worth a name. At the same time the intergrades are few and the series incomplete; and the chocolate forms, in life, occurred markedly segregated from the others. It is at least possible to point out a tangible character by which it differs from typical *mananensis*, which no one has yet done for the differentiation of *mananensis* from *rufibranchialis*. Should *mananensis* prove

[1] So called by me for the present in the provisional belief that Stimpson's form—if separable at all, which I doubt—is only a variety of the European form. Our knowledge, and consequently the nomenclature, of the group of red-gilled Eolids on this coast is in deplorable condition.

a complete synonym (as Gould thought it), or a variety (as I consider it), then *chocolata* should be written as above; but if *mananensis* is a valid species (as Professor Verrill holds), then *chocolata* may be written as its variety pending further knowledge. Ten specimens collected, all at Rocky Neck.

Aeolidiella papillosa (L.). It is a question whether our American form may not be as well worth a varietal name as our form of *Coryphella rufibranchialis*. Both species are, in European waters, noted for their variability, and have enormous synonymies. I think it much the same sort of question as that whether it is worth while to distinguish our form of *Purpura lapillus*—doubtless it is extremely close to the European form, and no one has yet pointed out a constant diagnostic difference, yet an American lot could hardly be confused with a European lot. Our form of the present species, in my experience, runs shorter, stouter, pinker and less variegated than the European form, as shown by the numerous and excellent figures accessible. No diagnostic character has been found in the dentition. Eight specimens collected, of which four at each locality; one a giant of 9 cm., one of an ordinary full adult size of about 6 cm., three smaller adults of 4–5 cm., and one young of about 1 cm.

Cratena veronicæ Verrill. One specimen about 1.8 cm. long, taken at Rocky Neck among a thick growth of undetermined hydroids, agreed very closely with Verrill's description of this rare and unfigured species. It was kept alive four days during which colored drawings were made, and then preserved for dissection.

Galvina picta (A. & H.), one specimen, adult. Rocky Neck, on hydroids.

Doto coronata (Gmel.), one specimen, adult. Rocky Neck, on hydroids.

Dendronotus frondosus (Ascanius), three specimens, one large adult of about 6 cm., two about half that size; the latter at Rocky Neck, the former at Brace's Cove.

Acanthodoris pilosa (Müller), one specimen of about 1 cm., at Brace's Cove.

Lamellidoris aspera (A. & H.),[1] eighteen specimens, 5 mm. to 12 mm. long, all but three or four at Brace's Cove, on Corallines.

[1] Our knowledge of the difficult and critical group of species centering around *L. aspera* and including a number of quite insufficiently characterized American forms has not reached a point where identifications can be looked on as reliable.

Ancula cristata sulphurea (Stimps.), one young specimen of about 8 mm., at Brace's Cove. It seems best to preserve Stimpson's name at any rate in a varietal sense though Bergh has united it with *cristata*. The differential character of the lower origin of the anterior appendages of the rhinophores is fully confirmed by my observation and seems pretty constant.

Total about 119 individuals, falling into 9 genera and 10 species or varieties.

The picture of local nudibranch life obtained from this bit of intensive collecting is tolerably clear.

Coryphella rufibranchialis mananensis appears to have been "swarming," not in the sense that it was enormously numerous—for the total figures are not impressive—but in the sense that adults were locally gathered together in far greater numbers than normal and with a distinctly gregarious habit, *e. g.*, six or eight in one pool, none in the next, rarely alone. The specimens ran remarkably uniform in size and lent support to the view that the species is an annual. None were seen *in coitu* either in the pools or in three days of captivity, but spawn was abundant and probably mating was about over for the year. Alder and Hancock say of the British form: "met with * * * in April, May and June, when it has attained its full size and is spawning. * * * In August and September the young are found considerably advanced." I believe our form will be found to have a more concentrated breeding season.

What has been said applies equally to the chocolate variety.

Aeolidia papillosa gave some slight indication of "swarming" in that it was considerably more numerous than normal, and gregarious in habit. But this was not nearly as marked as in the foregoing and the sizes were so conspicuously *not* uniform as to look against its being an annual. What I have seen in this and other years would fit well with its being a bi- or tri-annual with a "swarming" habit slightly later than that of *C. mananensis* and not so well marked. The spawn was fairly abundant and *all* of a *deep* rose color whereas Alder and Hancock say of the spawn of the British form that it is "occasionally white, but generally has a pinkish tinge, and is sometimes distinctly rose-colored." They give the breeding season as "spring and summer months."

The other forms taken present no indication of a sexual "swarm-

ing." It is true *Lamellidoris aspera* occurred in some numbers but the individuals varied much in size, were not markedly gregarious, and no spawn or coition was seen. The species seems to be a fairly common one at most times and according to Alder and Hancock breeds in May, June and July,—if indeed our species be identical.

None of the species taken are rarities except the var. *chocolata* (which, however, I have several times seen before) and *Cratena veroniæ*, which has not before been publicly reported since its original description, but has been taken a few times by Verrill in comparatively deep water. The present specimen is about three-quarters the size given by Verrill. One may hazard a guess that it will be found to have a shore breeding season sometime in the winter.

The other species are those we have often with us on the shore in very small numbers. While such of them as are hydroid feeders are almost necessarily to some extent gregarious, I know of no account of anything like a "swarming" of any of them except *Ancula cristata*.[1]

There is a certain fascination about the mysterious appearances and disappearances of these beautiful wanderers, and the first student fully to master a nudibranch (or at any rate an Eolid) life-history will have an interesting story to tell.

A collecting trip like this gives endless opportunity for alleged "observations" on "protective" and "warning," coloration and the like, which would be worth recording if fishes or other enemies looked with human eyes, from air into water, in full daylight, and *from on top*. Any true advance in this direction must be along the lines of work like Herdman and Clubb's most interesting experiments.[2]

52 Eliot St., Jamaica Plain, February, 1909.

---

[1] Herdman and Clubb. Third Report upon the Nudibranchiata of the L. M. B. C. District, Proc. and Trans. Liverpool Biol. Soc., iv, 1890, p. 134. "This species (*A. cristata*) was found * * * in April, 1890, and we took it in extraordinary profusion * * * in March, 1890. On one reef of rocks especially, a little way above low-water mark, there must have been many thousands of specimens present. For yards it was impossible to walk without treading on them, and handfuls were readily collected by scraping the specimens together from the mud-covered rocks." It should be remembered that for some reason the British coast supports nudibranch life in a vastly greater abundance of individuals, as well as of species, than ours does.

[2] *Loc. cit.*, *ante*, pp. 150–163.

NEW ENGLAND PYRAMIDELLIDÆ, WITH DESCRIPTION OF A NEW SPECIES.

BY HENRY W. WINKLEY.

A very excellent work on the New England *Pyramidellidæ* by Mr. Paul Bartsch has just been published by the Boston Society of Natural History. Specimens from the writer's cabinet were used in compiling this work. Unfortunately there are some omissions. I can blame no one but myself. My excuse is that my specimens were packed and stored, and a few collected later had not been worked up. Hence this supplement.

Turbonilla (Ptycheulimella) polita Verrill. Four specimens (determined by Verrill) are in the author's cabinet. The two best ones have ten whorls, and measure 7.5 mm. They are from Eastport, Maine.

Five specimens of *Odostomia*, collected at Provincetown, have the many lines of *trifida bedequensis.* They are about the size and shape of the P. E. I. specimens, and probably of that variety.

Odostomia (Odostomia) modesta Stimpson. Two excellent specimens of this species were found at Provincetown. They are slightly larger than the specimen used to illustrate Bartsch's article.

Odostomia bisuturalis. An interesting variety lacking the revolving line, occurs at Provincetown. Mention may be made of three pathological specimens of this species found at the same place. Deep sutures and everted lip, they are one of nature's jokes.

PYRAMIDELLA (SULCORINELLA) BARTSCHI n. sp. Fig. –

Shell broadly conic, semi-transparent, vitreous. Nuclear whorls small, deeply obliquely immersed in the first of the succeeding turns,

above which only the tilted edge of the last volution projects. Post-nuclear whorls well rounded, moderately contracted at the sutures and appressed at the summit, which falls in the middle of the peripheral sulcus. Periphery of the last whorl somewhat inflated, marked by a moderately deep sulcus, which is bounded on each side by a slender raised thread. Base short, well rounded, with a moderately broad umbilicus. Entire surface of spire and base marked by strong lines of growth and numerous fine spiral striations. Aperture large, rhomboidal; posterior angle obtuse; outer lip thin; columella slender, curved and revolute, provided with a strong fold at its insertion.

The type is in the Winkley collection, and comes from Woods Holl, Mass. It has seven post-nuclear whorls and measures, length 3.2 mm., diameter 1.6 mm.

I take pleasure in naming this for Mr. Paul Bartsch, of the Smithsonian Institution, and wish to express my thanks to him and Dr. Dall for their help on this and other species.

Mr. Bartsch writes concerning the above: "The single specimen is a most interesting one; it represents a group (*Sulcorinella*) not heretofore reported living."

A NEW CARINIFEX FROM THE SANTA CLARA LAKE BEDS (PLIOCENE), CALIFORNIA.

BY HAROLD HANNIBAL.

CARINIFEX SANCTÆCLARÆ n. sp.

Shell small (for the genus), heavy, subglobular; spire depressed; whorls three, inflated, subcarinate at outer margin above, from which the shell slopes concavely upward to a raised ridge bordering a narrow, rather deep sutural groove. Umbilicus narrow, marked off by a sharp carina; lip complete, semilunar, full, reflexed below. Shell marked by moderate, diagonal growth-lines, occasionally raised into coarse ridges. Alt. 5 mm., lat. 8 mm.

Type locality: Near Los Gatos Limestone Quarry, Los Gatos, Santa Cruz Mts., Cal.

This species is easily recognized by the concave upper surface of the whorls. It varies somewhat in size, some specimens being twice as large as the type, which is probably just mature.

It and *Amnicola yatesiana* J. G. C. are the two characteristic

species of the Santa Clara Lake beds. Cooper[1] listed it as *Carinifex newberryi* var. *minor*, which he had described previously, from Clear Lake (living). The two have nothing specific in common except their size.

Associated with these two species at various points about the valley are the following species still living in northern California:

Anodonta cygnea nuttalliana Lea.

Anodonta angulata Lea.

Pompholyx effusa Lea.

Valvata virens Tryon.

In addition there are several indeterminate forms, an excellent flora, and fragments of mammalian bones.

The figure, which will appear in a later issue, represents the type, x 2, from a photograph by John Howard Paine, of Stanford University.

Stanford University, Cal.

NOTE ON PLANORBIS BINNEYI TRYON.

BY FRANK COLLINS BAKER.

Mr. Winkley's note on "Variation" in the last NAUTILUS is very interesting, and most of the examples given are characteristic. On page 16, however, there is a reference to *Planorbis* which shows that several species have been confused. The Dalton shells are *binneyi* and not *trivolvis*, as I have ascertained recently from an examination of specimens in the Boston Society of Natural History, received from Mr. Winkley.

This large *Planorbis*, surpassed only by the *magnificus* of Pilsbry, has often been confused with *trivolvis*, most authors overlooking Tryon's reference to this species in his review of Binney's work in the American Journal of Conchology.

P. binneyi is a northern form, in many localities replacing *trivolvis*. I have collected it in Tomahawk Lake, Wisconsin, and in the St. Lawrence River at Thousand Island Park. It may be known by its large size, very *wide* whorls and pronounced longitudinal sculpture. Specimens of the same size are much wider than *trivolvis* and more

[1] Cooper, J. G., Proc. Cal. Acad. Sci. (2), iv, p. 172, 1894.

corpulent. It has been identified as *corpulentus* Say, but this is a totally different species, the characters of which have been very fully described by Mr. Bryant Walker in a previous volume of the NAUTILUS.

It would be interesting to know the exact range of *binneyi*, and I would suggest that conchologists generally examine their collections for this species, sending the information to either Mr. Walker, of Detroit, or to me (or to both of us).

A large amount of exact data is needed to accurately determine the range of the various species of fresh-water pulmonates, and a few notes on this magnificent *Planorbis* will aid materially in this direction.

PISIDIUM MARCI, N. SP.

BY V. STERKI.

Mussel rather small, well inflated, high, slightly inequipartite and oblique, with outlines well rounded; superior margin short, nearly straight, with a rounded angle at its posterior end and a very slightly marked one at the anterior; posterior and inferior margins forming one regular, nearly circular curve, supero-anterior slope slightly marked; beaks little posterior, large, somewhat flattened, well prominent; surface shining, with medium fine, irregular striæ and several distinct lines of growth, the upper one marking off the nepionic mussel (as in *Musculium*); color straw to yellowish-horn,[1] with slightly marked lighter and darker zones; hinge short, rather slight, but well formed, with a short ligament, plate narrow; cardinal teeth somewhat curved; the right one moderately long, its posterior part thicker and grooved; left anterior very short, "high," abrupt, thin, the posterior almost longitudinal, twice as long as the anterior, less "high," slightly thicker and grooved in its posterior part; lateral cusps short, pointed, the outer ones of the right valve smaller but distinct, not pointed.

Long. 3.5, alt. 3.4, diam. 2.5 mm.

Habitat: Mt. Leidy, Utah, at 10,000 feet, in a stagnant pond, collected by Mr. Marcus H. Dall (son of Dr. Wm. H. Dall), in whose honor the species is named, on September 18, 1905.

This *Pisidium* appears not to be closely related to any of our

[1] Most specimens appear brownish from the dried soft parts.

described species, and cannot be referred to one, even taking into account the high altitude and the nature of the locality. It somewhat resembles some high forms of *P. scutellatum* St., but is less oblique, has broader beaks, and the surface striæ are coarser. The short, pointed inner lateral cusps of the right valve are notable. The nine specimens in the lot are remarkably uniform, two of them somewhat over half grown, the others apparently mature. The one opened for examining the hinge contained no visible embryos. The types are in the U. S. Nat. Mus., No. 187491.

NOTES.

A Giant Squid.—I received a letter to-day (April 2, 1909) from Provincetown which contains an item I think should go on record. It is as follows:

"The schooner 'Annie Perry' found a giant squid off Highland Light, Truro, Mass., last week and tried to hoist it on board the vessel, but the rope cut the body in half. It was perfectly fresh, and the crew took some of it for bait and caught quite a number of fish. I saw one of the tentacles which they brought ashore, and it was perfectly fresh then. It was seven feet six inches long, and the suckers were as large as a silver quarter. A piece of the body was, I should think, four inches in thickness and the tentacles must have been four inches in diameter at the larger end."

The above must be the first record of the giant squid on our coast, although they must exist off shore in deeper water. I have written to see if I can secure the beaks or any part to aid in its identification.

(April 16, 1909.) I have received a little more information in regard to the giant squid taken off Highland Light, Truro. A letter to-day says:

"The captain of the vessel who took the squid says it was a very little larger than their dory, which is 16 or 17 feet in length. The tentacle which they brought ashore was 7½ feet long and had 'sucker cups' the *whole length* of it." [This would show it was one of the shorter tentacles.] "The whole animal was shaped like the common squid, that is, the body was not globular like the cuttlefish, but had fins or flippers on the tail just like the common squid. The piece which I wrote about was cut out of the side, and about four inches thick, and the whole body was about as large around (circumference)

as a fish-barrel. The tentacle was 7½ feet long, four inches thick at the big end, and tapering away to a point."

The above is what was written to me, but my correspondent could not get any of the suckers, as the tentacle was thrown away before he received my letter.—J. HENRY BLAKE.

18 Prentiss St., Cambridge, Mass.

DR. VICTOR STERKI, of New Philadelphia, Ohio, known for his work on North American *Sphaeriidæ* and *Pupillidæ*, has been appointed an assistant in conchology in Carnegie Museum, Pittsburg. Dr. Sterki's collection became the property of the Museum some years ago.

FERGUSON COLLECTION.—It will no doubt be a matter of interest to the readers of THE NAUTILUS to know that the large and important collection of the late David Wilson Ferguson has been presented to Columbia University by his sons, W. C. Ferguson, Esq., and Professor George A. Ferguson, of Columbia. A room has been assigned for the exhibition of the collection in its entirety.—C. DAYTON GWYER.

THE CONCHOLOGICAL MAGAZINE.—With the April number (Vol. iii, No. 4), Mr. Y. Hirase has decided to suspend the publication of his journal until about May, 1910, when "No. 5, Vol. iii, will be sent to you in a finer and larger form." It is to be hoped that conchologists will support more generally this valuable publication, the plates alone being worth more than its subscription price. In the later numbers many new species have been described.

THE August number of THE NAUTILUS will again be omitted, owing to the absence of the editors during the greater part of July and August. The usual number of pages will be given by increased size of other months.

THE latest test when he comes home at 2 a. m. is to make him try to sing the chorus of the song:

She sells seashells on the seashore,
The shells she sells are seashells, I'm sure,
For if she sells seashells on the seashore,
Then I'm sure she sells seashore shells.

If he can, he's all right.

THE NAUTILUS.

VOL. XXIII. AUGUST-SEPTEMBER, 1909. No. 4

MOLLUSKS FROM NORTHEASTERN MEXICO.

BY H. A. PILSBRY.

These shells were collected by Mr. A. A. Hinkley during the past winter, in the state of San Luis Potosi, Mexico. The Panuco river system has proved to be unexpectedly rich in fresh-water mollusks, having a fine group of *Unionidæ*, a remarkable lot of *Pachychili*, a new genus of *Pleuroceratidæ*, a *Gundlachia*, and various interesting *Amnicolidæ*. Among the latter there are several genera unlike any known American forms, and related to genera of the Old World. I have elsewhere called attention to a little snail found by Mr. Hinkley last year, *Coilostele tampicoensis*, which is closely allied to species of Spain, Syria and Arabia, but of a genus not before known in the western world. The two genera following, *Emmericia* and *Pterides*, seem to be similarly allied to European groups, and are certainly quite unlike any other American *Amnicolidæ* yet known.

EMMERICIA.

This genus was established by the late Professor Spiridion Brusina, of Agram, for a group of fresh-water snails resembling *Bithynia* in shape, but having a paucispiral operculum and a thickened, expanded lip, behind which there is a rounded ridge or wave. The species inhabit Dalmatia and the adjacent region around the head of the Adriatic Sea. The commonest and typical species is *E. patula* (Brumati).

Several species found in the state of San Luis Potosi by Mr. Hinkley are so close to *Emmericia* in conchological characters that I do not feel justified in separating them generically from that group,

though when the soft parts and operculum come to hand it is quite possible that the Mexican snails may prove to be generically distinct from the Dalmatian. They differ chiefly by wanting a swelling behind the expanded lip, and for this reason I erect for them the subgenus *Emmericiella*, type *E. novimundi*.

The Oriental group *Tricula* Benson, with a few Indian and Philippine species, resembles *Emmericiella*, but the inner lip is straightened, making the aperture narrow and piriform.

EMMERICIA (EMMERICIELLA) NOVIMUNDI n. sp. Pl. 5, figs. 9, 10.

The shell is imperforate but openly rimate, rather solid, ovate-conic, smooth and glossy. The spire is straightly conic, apex obtuse, the tip being depressed. Whorls $4\frac{1}{2}$, convex, separated by rather deep sutures; last whorl well rounded, ascending to the aperture. The aperture is oblong, vertical, or has the basal lip a little advanced. Peristome continuous, well expanded, thickened on the face and within; the outer lip is just perceptibly retracted near the upper insertion; basal margin well rounded; columella concave, thick. Parietal callus heavy, adnate, but with distinct edge in fully adult shells, spreading forward in front of the aperture. Length 3.1, diam. 1.9 mm.; longest axis of aperture, including peristome 1.65 mm. (fig. 10).

Bank of Choy River near the cave, State of San Luis Potosi.

The specimens are bleached; color in life unknown. These are two perfect examples of the same size. With these are associated several decidedly larger shells, in which the apex is broken, probably one whorl being lost. One of these—figured in profile, fig. 9—measures, length 3.5, aperture 1.9 mm., 4 whorls remaining.

EMMERICIA (EMMERICIELLA) LONGA n. sp. Pl. 5, figs. 11, 12.

The shell resembles *E. novimundi* but is more shortly rimate, of a turrited shape, with $5\frac{1}{3}$ more convex whorls. Aperture is more produced forward below, and the parietal callus spreads forward less. The outer and basal margins are well expanded. Length 4.1, diam. 2, longest axis of aperture including lip 1.6 mm.

Two complete and one broken specimen, found with the preceding species.

The new subgenus EMMERICIELLA is proposed for American Emmericiæ, in which there is no wave or ridge behind the lip-expansion, and the columellar margin of the aperture is built forward

more than in European forms, forming a conspicuously rimate umbilical region. Type *E. novimundi.*

PTERIDES, n. gen.

The shell is minute, rimate, long and narrow, composed of many convex whorls, (7 to 10 in known species); apex obtuse, the first whorl large. Aperture small, diagonal, elliptical, the peristome thin, continuous, expanded throughout or at the ends, where it is retracted to form shallow spout-like sinuses. Operculum and soft parts unknown. Type *P. pterostoma.*

These remarkable little snails are without relatives among known American genera. They may be compared only with a genus found about forty years ago in the flood-débris of the rivers of southern France and Spain, and described by Bourguignat under the generic name PALADILHIA,[1] and with another group, LARTETIA[2], described from quaternary fossils found around Paris, but now known to inhabit subterranean waters and springs of central Europe, where most of the German species have been described as *Vitrella* Clessin.

Both *Paladilhia* and *Lartetia* are small, slender shells with the aperture ovate, the outer lip bending forward below, retracted near the upper insertion. In *Paladilhia* there is a rather narrow, Pleurotomoid notch above, leaving a sort of indistinct sinus-band; in *Lartetia* there is only a broad, rounded sinus. In my opinion the two groups are not generically distinct, *Lartetia* being at most a subgenus of *Paladilhia.*[3]

These forms, and especially the *Lartetiæ*, are apparently the nearest allies of the Mexican *Pterides*, which differs from them chiefly by the diagonal, oblong aperture with broadly expanding lip.

---

[1] *Paladilhia* Bourguignat, Monographie du Genre Palad., 1865. The type, *P. pleurotoma* Bgt., is a snail measuring 4x2 mm., found in the drift débris of the Lez, a little river near Montpellier, dept. de l'Hérault, and believed to inhabit subterranean watercourses.

[2] *Lartetia* Bourguignat. Catalogue des Mollusques terrestres et fluviatiles des environs de Paris a l'époque Quaternaire (in E. Belgrand: Le Seine—1, Le Bassin Parisien aux âges Antéhistoriques), pp. 15, 17 (1869). Type *L. belgrandi* Bgt.

[3] The normal forms of the genus are those called *Lartetia*, *Paladilhia* being an extreme development in one or two species only; but the latter name has priority for the genus, having been described in 1865, while *Lartetia* dates from 1869.

PTERIDES PTEROSTOMA n. sp. Pl. 5, figs. 1, 2, 5, 6.

The shell is rimate, long and slender, composed of numerous slowly increasing, strongly convex whorls. Apex obtuse. Aperture diagonal, obliquely oval. Peristome thin, continuous, very broadly expanded, retracted and more broadly spreading at the two ends, where it is somewhat spout-like. Color unknown, the specimens being bleached.

Length 2.25, diam. of last whorl above aperture .75 mm.; longest axis of aperture 1.1 mm.; whorls 7 (figs. 5, 6).

Length 2.75, diam. above aperture .8, longest axis of aperture 1.2 mm.; whorls $8\frac{1}{2}$ (figs. 1, 2).

Eight specimens examined. There is considerable variation in length and number of whorls. Figs. 5, 6 represent the type.

PTERIDES RHABDUS n. sp. Pl. 5, figs. 3, 4.

The shell is very slender, slowly tapering to the rather large summit, composed of nearly 10 very convex whorls separated by a deep suture; last whorl very convex. Aperture small, elliptical, diagonal, rounded at both ends. Peristome thin, continuous, somewhat expanded, deeply sinused above, the parietal margin adnate for a short distance. Length 3, diam. above aperture .75, longest axis of aperture .7 mm.

Choy River near the cave, San Luis Potosi, Mexico.

This species is much narrower than *P. pterostoma*, with more whorls and a smaller aperture. The outer lip may perhaps become more expanded with further growth; if so it would apparently be like that of *P. pterostoma*. Described from a single specimen. While it may possibly prove to be an extreme form of *P. pterostoma*, I do not feel justified in uniting such unlike forms without evidence of intergradation.

PTERIDES BISINULABRIS n. sp. Pl. 5, figs. 7, 8.

The shell is very slender, slowly tapering from the very obtuse apex, composed of 8 smooth, strongly convex whorls, the last half of the last whorl free from the preceding. Aperture diagonal, elliptical, the peristome continuous, free, thin, hardly expanding except at the two ends, where it is retracted, slightly produced and flaring. The outer margin is arched a little more than the inner. Length 2.5, diam. above aperture .7, longest axis of the aperture .65 mm.

Gannina River, three miles S.-W. of San Dieguito, State of San Luis Potosi. A single specimen taken.

Smaller than *P. pterostoma* with the last whorl free, the aperture sinused at both ends, and the lip hardly expanded.

DESCRIPTIONS OF TWO NEW CUBAN LAND SHELLS.

BY DR. CARLOS DE LA TORRE, HAVANA, CUBA.

MACROCERAMUS HENDERSONI n. sp. Pl. 4, fig. 5.

The shell is perforate, conic-turrited, thin, the last 5 whorls corneous-brown, profusely and finely mottled with opaque white, with a series of irregular, lengthened brown spots at the periphery, showing above the suture on the spire; first $2\frac{1}{2}$ whorls blackish-brown, the next two dark, broadly maculate with white. Surface glossy, the first 4 whorls smooth, the rest closely and finely striate, the striæ low, as wide as their intervals, and very oblique. The spire is straightly conic, apex rather acute. Whorls 11, slightly convex, separated by a smooth suture, the last whorl well rounded peripherally and beneath. Aperture very oblique, ovate, marked with brown inside. Peristome expanded and reflexed, yellow or pale red. Columella brown, short, dilated, and having a rather strong but short fold above. Parietal callus transparent. The internal axis is slender and distinctly twisted spirally.

Length 19, diam. 9.5, length of aperture 8 mm.

Length 20, diam. 9.8, length of aperture 8 mm.

Length 18, diam. 9.5, length of aperture 8 mm.

Sierra de Cubitas, Camaguey, Cuba.

This species is very distinct from all others now known, differing from the *canimarensis* group by the total absence of a basal carina, and from the forms prevalent in Eastern Cuba by its thin texture, sculpture and coloration. It is one of the largest and finest of the Cuban species.

The coloration is very well shown in the figure. Besides the profuse and fine mottling with white there are occasional longitudinal white flames, bordered on the left side with dark, unmarked spaces.

CHONDROPOMA HENDERSONI n. sp. Pl. 4, fig. 6.

The shell is umbilicate, conic-turrite, narrowly truncate, rather solid. Last four whorls rather closely and subregularly marked

with slightly oblique stripes of red-brown, ochre, blue and white, the base red with white radial streaks; when whorls above the last four are retained they are scarlet with some white streaks.

The surface is glossy, with traces of fine, nearly effaced growth-striæ, and under close inspection some widely spaced lines may be seen, indicating periodicity in growth. Spiral sculpture consists of fine, distinct but low spiral threads, larger ones at intervals: 4, 5, or 6 smaller striæ between the larger; around the umbilicus the striæ are coarser, alternately larger, and latticed by the growth-striæ. Above the penultimate whorl the spirals are subequal. The spire is straightly conic, with 4 whorls below the tongue-shaped apical septum; but an empty whorl or more persists above the septum. The whorls are strongly convex, separated by a smooth, simple and deep suture, which close to the aperture descends a little more rapidly, the last whorl becoming free there for a short distance. The aperture is vertical, slightly longer than wide; the outer side more convex than the inner; reddish-brown inside. Peristome thin, the inner half nearly white, outer half brown-tinted; broadly reflexed throughout, a little retracted above and below, slightly produced in a short lobe above. Operculum unknown.

Length 25, diam. 15.5 mm.; aperture with perist. 12 mm. long.; 4 whorls remaining.

Length 27, diam. 15 mm.; aperture with perist. 12 mm. long., 5 whorls remaining.

Sierra del Ancón, northwest of Viñales, prov. Pinar del Rio, Cuba.

This magnificent species is related to *C. hamlini* var. *major* Crosse (Jour. de Conchyl., 1890, p. 300, pl. v, f. 6 *a*, *b*), but that is a far smaller shell, length about 17 mm., with chestnut-brown streaks extending upon the base. The figure in black and white gives a poor idea of the beautiful coloring of this shell, which is named in honor of my friend, John B. Henderson, Jr.

DESCRIPTIONS OF NEW CUBAN LAND SHELLS.

BY JOHN B. HENDERSON, JR.

HELICINA TORREI n. sp. Pl. 4, figs. 1, 2, 3.

The shell is depressed, very solid, the last whorl cream-white, gradually changing on the penultimate to sulphur-yellow, the color

of the spire. The surface is lusterless, with sculpture of strongly raised, rough spiral ridges parted by much wider concave intervals. On the last whorl there are 18 such ridges, stronger and more widely separated in the peripheral region. The intervals are obliquely roughly striate, and the wider ones above the periphery have also a few spiral threads. Six spiral ridges show on the penultimate whorl. They gradually become weaker on the spire. The embryonic whorl is rather large (2 mm. diam.), and smooth except for faint radial striæ. Whorls 4, rapidly widening, almost flat, the last whorl descends shortly to the aperture, and is convex beneath. Aperture large, flaring, strongly oblique, white with a trace of yellow within. The peristome is well expanded, thickened within some distance from the edge. There is a transverse tubercle at the junction of columella and basal lip. The axial callus is pure white, not very thick, spreading within nearly to the outer termination of the lip. Edge of parietal callus is very thin.

Alt. 15.5, diam. 26.5 mm.

Operculum calcareous, shining, bluish-white with iridescent lights, reddish on margins and densely covered with minute granules separated by species of about equal width.

Collected by T. Wayland Vaughan at Los Negros, 25 miles southeast of Bayamo in the province of Oriente, Cuba, in woods on low limestone hills.

This superb species I take pleasure in naming after Dr. Carlos de la Torre of Havana.

Cepolis alauda cymatia n. subsp. Pl. 4, fig. 4.

The shell closely resembles *C. alauda avellanea* (Fér.) in texture and coloration, but differs by its more elevated, more conic spire, and by having a strong oblique crest behind the lip. Alt. 24, diam. 28 mm.; whorls $5\frac{1}{2}$.

Cuba; exact locality of the type unknown.

This well-marked variety, not uncommon in collections, appears hitherto to have escaped observation. I have no doubt that in a critical revision of the *Coryda* group this form will be given specific rank.

BIFIDARIA ARMIFERA SAY, AND ITS VARIETIES.

BY V. STERKI.

It has long been known that *B. armifera* is variable with respect to some of its features, but it seems that no attempt has been made to ascertain whether there are any real, tangible varieties. Careful examination of about 2,000 specimens from many places,[1] during the last few months, has proved that, after eliminating *B. clappi* as a distinct species, there are several well-marked varieties, with features which are of interest also in a general way.

B. armifera (Say) typical.[2] Shell more or less fusiform, decidedly short to rather elongate and slender, vitreous, colorless to very pale horn, or slightly milky-white; surface shining, with comparatively coarse, irregular striæ; whorls 6½–8, the average being about 7, the last somewhat rounded, keel-like, at the base, somewhat flattened over the palate, usually with a distinct, linear scar over the lower palatal plica; aperture rather large, rounded, peristome well everted, continuous, or its ends approximate, often with a connecting callus; inside the palate a rather strong, white callus into which the palatal plicæ merge; parieto-angular lamellæ rather large and long, distinctly complex, the angular connecting with the peristome, the spur[3] of the parietal small but distinct; columellar massive, encircling the column, with an annex downward and inward; inferior columellar variable as to size, shape and position, sometimes a mere callus, often wanting; lower palatal plica regular, rather long, stout, upper palatal much shorter and smaller; suprapalatal distinct or slight or wanting; an interpalatal is not infrequent.

Alt. 3.5–5, average 4–4.5, diam. 2.2–2.5 mm.

Distributed over the whole area covered by the species.

B. a. interpres, n. var. Near the typical form, generally somewhat slender; inferior columellar lam. rather high up, the base is narrow inside and more keel-like outside; the aperture is narrowly rounded at the base, and from this feature specimens are easily recognized. More than any other form this shows clearly that the so-called "basal" is really an inferior columellar.

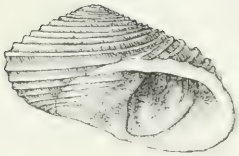
[1] There are 160 entries in my collection of *B. armifera* and varieties, and many others were received for examination.

[2] Dr. Pilsbry had the kindness to look up Say's original specimens in the collection of the Phila. Acad., and wrote me that they are of this form.

[3] See The Nautilus, XXII, p. 108, foot-note.

1

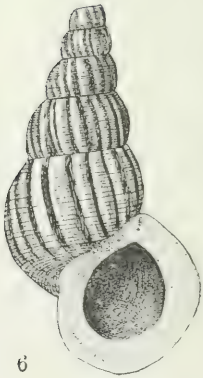
2



3

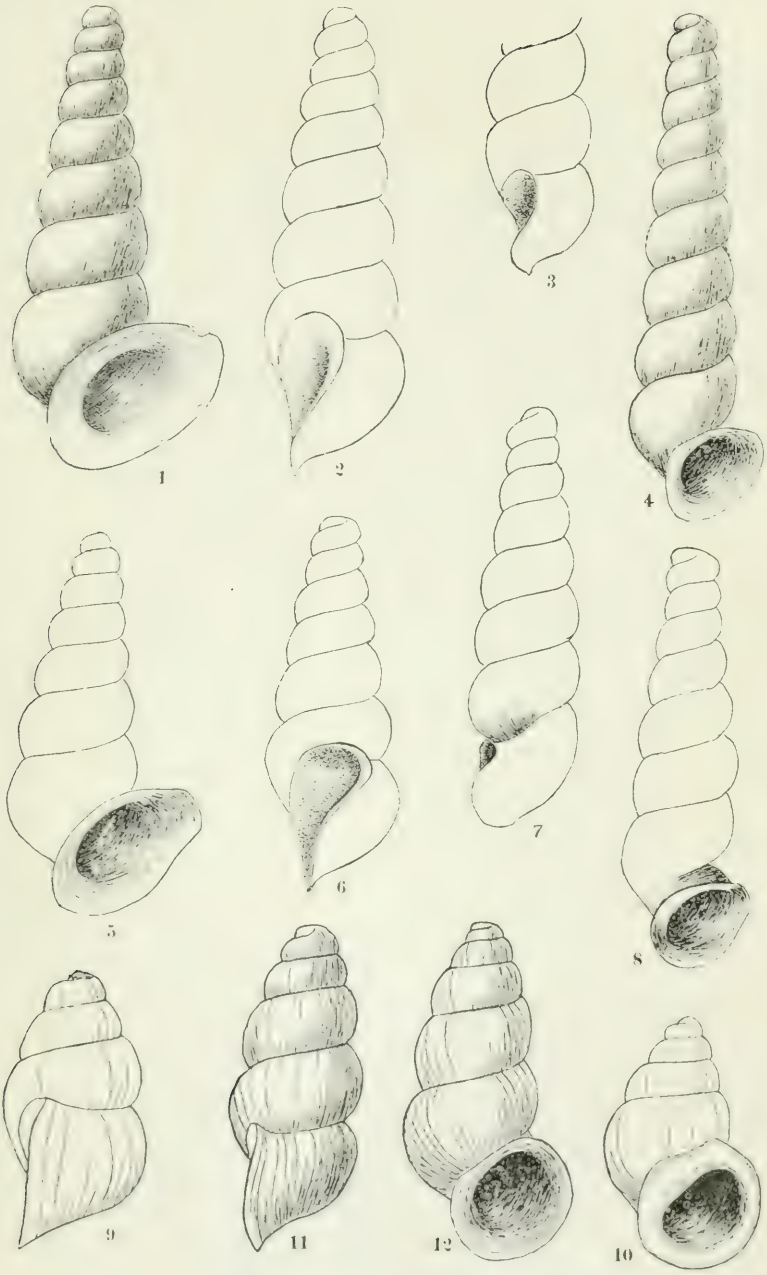
4

5



6

NEW CUBAN LAND SHELLS.



EMMERICIA AND PTERIDES.

Distribution: Southern, especially southwestern; it appears to be the prevalent form in Kansas, Arkansas, Oklahoma, and thus represents a geographical variety.

B. a. similis, n. var. Averaging somewhat smaller; more cylindrical, often more or less conical; whorls less convex; surface striæ slighter; shell generally more milky-whitish, as noticed especially when a number of each, *armifera* and *similis*, are placed side by side; peristome never continuous, somewhat less everted; the columellar lam. is slighter, generally more protracted downward, the lower palatal is shorter, sometimes quite short; the spur of the parietal is larger.

Distribution; Northern New York to Iowa, Minnesota, Ontario.

B. a. affinis, n. var. Somewhat small and slight; near *similis*, but less cylindrical, rather somewhat oblong; whorls 6–6½, somewhat more convex than in *similis*, the last rounded at the base and little flattened over the palate, with none or a slight scar over the lower palatal plica; aperture somewhat rounded, peristome never continuous; parieto-angular lam. well connected with the peristome, spur of the parietal larger than in typical *armifera;* columellar nearly axial, a broad lamella, reaching down to the base, with distinct lines of growth, visible from the outside through the (fresh) shell below the umbilicus, as in *B. contracta;* inferior columellar wanting or small; lower palatal quite short, or even a transverse, short, abrupt lamella.

Alt. 3.5–4, diam. 2.2–3 mm.

Distribution: Northern Ohio, Michigan, Indiana to Minnesota and Kansas; seems rather scarce in the first-named States, common in Kansas. Found, *e. g.*, on sandy dunes on Lake Erie in Ohio.

It is notable and significant that both the columellar and the lower palatal in this form are of the same shape as in *B. contracta*, while in typical *armifera* they are quite different, yet the latter shows a tendency to having the peristome continuous, while in *affinis* its ends are always apart.

B. a. abbreviata, n. var. Averaging rather small, slight, somewhat fusiform to ovate or cylindro-conical; apex low, conical or rounded; whorls only 5½–6 (rarely 6½), little convex, with the penultimate comparatively broader than in the other forms, the last rounded at the base, slightly flattened over the palate; color somewhat milky-whitish; surface with a dullish gloss, striæ fine and slight; aperture somewhat small; peristome moderately everted, its ends (in

most forms) comparatively far apart; lamellæ and plicæ: parieto-angular not or slightly connecting with the peristome, spur small; columellar rather as in typical *armifera*, but smaller, slighter; inferior columellar tooth-like, placed obliquely, more constant than in other forms as to size, shape and position; lower palatal regular but slight, often rather short; suprapalatal rather constant.

Alt. 3.3–3.8, rarely 4–4.2, diam. 1.9–2.2 mm.; some specimens are low, almost globular, *e. g.*, alt. 3.2, diam. 2.1 mm.

Numerous specimens seen from Bismarck, N. D.; Eastport, Ia. (Missouri River drift); Lincoln, Neb.; Nickerson, Kans.

As *B. a. ruidosensis*, Prof. T. D. A. Cockerell[1] has denoted a form from New Mexico: "Shell only 4 mm. long, with the two outer teeth a considerable distance within the aperture." The description is somewhat meagre, but the variety may stand on its merits. There are, however, specimens from various places of New Mexico with the lower palatal plica rather short and rather remote from the margin, the columellar rather simple and comparatively small; alt. 3.8–4.2 mm.; they may be of *ruidosensis*.

The interrelations of these forms will be discussed elsewhere, and figures given.

B. armifera appeared to be rather well known, being the largest of the genus, fairly common over a wide territory, and probably the one best represented in collections. Yet a closer study of its forms has shown some interesting facts with respect to morphology, phylogeny and distribution. As Mr. Clapp expressed it, with a view to this variation and the externally similar *B. clappi*: "We can no longer say that a *Bifidaria* is simply *armifera* because it is big and white."

MORE NOTES ON THE FAMILY PYRAMIDELLIDÆ.

BY PAUL BARTSCH, M. S., PH. D.

In the "American Journal of Science" for June, 1909, pp. 475-484, Dr. K. J. Bush reviews my paper on the "Pyramidellidæ of New England and the Adjacent Region," and discusses in a general

[1] THE NAUTILUS, XIII, p. 36. The specimen referred to is not at hand, and I cannot remember exactly what it was. The type is in coll. Acad. Nat. Sciences.

way a number of other papers upon the same group published by Dr. Dall and myself, as well as some of her own and of Prof. Verrill's works upon the family.

In this contribution quite a number of facts are presented, which are at variance with the data at my disposal. I am forced to publish the following notes in order that there may be no misunderstanding.

It is a great pity that Dr. Bush did not publish the manuscript she prepared in 1896. As it is, the MS. names have no standing and cannot enter into the discussion of the present work.

I was not aware that Dr. Bush was working upon this group at the time I prepared my manuscript, her last publication upon it having appeared nine years ago, nor was I aware that Dr. Bush had seen Mr. Winkley's material, which was incorporated in my report, as was implied in her review. I wish likewise to disclaim any intended discourtesy in not acknowledging Dr. Bush's work in my introduction, for I considered both of her papers as extralimital. The one dealt with Carolinian, Floridian, West Indian and South American species (with a reference to *Turbonilla interrupta* Totten); the other with Bermudan forms.

The matter of classification is so fully discussed in the monograph on the West American Pyramidellidæ by Dr. Dall and myself now going through the press, that I shall not refer to any of the statements concerning it here, but will refer any one interested in the subject to the forthcoming volume. I will say, however, that *Pyrgostelis* (which has no standing) was never used by us, Dr. Bush notwithstanding, and that *Triptychus* and *Peristichia* are Pyramidellid ; they have a sinistral nucleus and columellar folds, the family characters of the group. Here also I may say that Dr. Bush is in error when she states that Dr. Dall and myself furnished the text on the mollusks in Dr. Arnold's paper on the Paleontology and Stratigraphy of the marine Pliocene and Pleistocene of California : Mem. Cala. Acad., III, 1903. We contributed only that part which deals with the Pyramidellidæ.

I believe that all of the present differences of opinion could have been avoided if Dr. Verrill had yielded to my request and had sent me specimens of what he considered typical representatives of some of the older species as well as some of those described by himself. All of the early collections of northeastern American marine

invertebrates were placed in Professor Verrill's charge by the U. S. Bureau of Fisheries for report, and have been in his care until very recently, when most of them were returned to the custody of the U. S. National Museum. It would seem only natural that I should have had specimens for comparison ; first, because they represented government material *reported upon*, and, secondly, because when Miss Bush was at work upon her southern report, Dr. Dall furnished her with cotypes and authentic material as requested, and as duly acknowledged in her report.

I neither had nor have any desire to enter into a controversy with any one concerning these old species, the original descriptions of which in some instances are so poor that it is scarcely possible to refer them to the proper subgenus, and which in most cases might be applied to almost any member of a subgenus. No types are extant, some having been burned in the Chicago and Portland fires and others lost.

There is only one of two ways open in dealing with such names, viz., to place them as " sedes incertae," or to fix them to some known species. The latter method was adopted by Prof. Verrill, and I attempted as far as it was in my power to follow his dictum, the only logical method under the circumstances.

The subgenus *Eulimella* will have to be dropped from our New England list, now that Dr. Bush has been able to show that the two specimens identified by Prof. Verrill as *Eulimella ventricosa* Forbes, are *Turbonilla* (*Ptycheulimella*) *polita* (Verrill) and *Aclis tenuis* Verrill. I have seen no specimens of *Eulimella* from New England, and quoted it on Dr. Verrill's authority as stated.

Pyramidella (*Syrnola*) *smithii* Verrill has only a single fold on the columella, hence is a *Syrnola;* not a *Eulimella*, which has two folds.

I have seen C. B. Adams' types at Amherst College, and feel no need of changing my statement regarding *Pyramidella* (*Syrnola*) *fusca* and *producta*. I agree with Dr. Bush that they are not typical *Syrnolas;* that is why I placed the ? after *Syrnola*. It is quite probable that these two species and *S.? winkleyi* may belong to a new group, but I have refrained from giving it a name until some knowledge of the animal might be obtained. These are by no means *Odostomias*, but are nearest to if not exactly congeneric with *Syrnola*.

My *Turbonilla* (*Turbonilla*) *nivea* Stimpson, was an acceptance of Professor Verrill's interpretation of that species. The specimen listed

as cat. no. 45481 U. S. N. M., from station 949, off Martha's Vinyard, 1881, was determined by him, and the others which I listed, were carefully compared with it and was found absolutely conspecific.

As to *Turbonilla* (*Turbonilla*) *striata* Verrill, I must again say that I followed Prof. Verrill's dictum; the 15 specimens listed as cat. no. 62340 U. S. N. M., from Naushon gutters, 1883, were determined by him, like the 11 entered under cat. no. 203815 U. S. N. M., from Naushon, 1883, the two last being part of the material recently returned, and the other two lots listed are absolutely conspecific with these. I am therefore at a loss to understand how I could possibly have erred in the interpretation of the species.

I have no additional data concerning *Turbonilla* (*Chemnitzia*) *æqualis* Say.

Turbonilla (*Strioturbonilla*) *bushiana* Verrill, will have to remain in this subgenus. It falls well within Sacco's definition: "Testa sicut in TURBONILLA (stricto sensu), sed transversim striolæ parvillimæ (sub lente vix visibiles) plerumque tantum in spatiis intercostalibus, interdum etiam supra costas decurrentes saepe suboblitæ. Costæ longitudinales basim versus gradatim evanescentes. Costicilla circumbasalis nulla. Testæ basis subrotunda."

Page 481. I shall reserve my judgment regarding *Turbonilla* (*Pyrgiscus*) *areolata* Verrill, until I have had the opportunity to make comparisons with the type. I may say, however, that the affinity of our specimens are not with *Turbonilla* (*Pyrgiscus*) *vinæ*, as suggested by Dr. Bush, but with *Turbonilla* (*Pyrgiscus*) *elegans* Verrill.

The most interesting part of the whole review comes under the head "*Turbonilla interrupta* (Totten) Bush, 1899, pp. 148–151."

Of this species Dr. Bush gives her own interpretation, and emphasises her opinion with a figure of what she considers the true "*interrupta* Totten"—stating that "the specimen described (p. 87), and figured by Bartsch, unfortunately does not agree with this, therefore I would distinguish it as *Turbonilla pseudointerrupta*, new name."

There is only one fault with Dr. Bush's deductions, namely, that our figure and description were based upon the same individual which has served for her figure of typical *interrupta*. The figured specimen from Sta. 770, Narragansett Bay, in 8 fms., dredged in 1880, is now entered under cat. no. 202889 U. S. N. M. It came to us in

1907, when a large part of the Bureau of Fisheries collection in Dr. Verrill's charge was turned over to the U. S. National Museum, and bears the legend, "Sta. 770, Figured, *T. interrupta* Totten," in Dr. Bush's handwriting. The name *Turbonilla pseudointerrupta* Bush, is therefore superfluous.

Dr. Bush states that *Odostomia bushiana* Bartsch, is preoccupied by *Odostomia bushiana* Jeffreys, 1884. I have been unable to find any such name. The only reference to *bushiana* by Jeffries in 1884, that I know, is to *Turbonilla bushiana* Verrill.

I am not in position to give any opinion upon what Dr. Bush's young shell from Woods Holl may be, but I do know that our shell is an *Odostomia* belonging to the subgenus *Iolæa*. *Iolæa*, like *Menestho*, from which it is distinguished by having an umbilicus, is quite variable in its strength of sculpture. *Odostomia* (*Iolæa*) *hendersoni* Bartsch, is neither the *type species* nor the norm, of *Iolæa*, but comes well within its definition. It does not belong to the same family to which *Aclis* belongs.

A single specimen of *Phasianella sulcosa* Mighels, was found by Mighels in Casco Bay. It was described in 1843, Bost. Journ. Nat. Hist., IV, p. 358, Pl. XVI, f. 4, and later doubtfully referred to *Rissoella* by Stimpson. It is quite probable that it really belongs to *Menestho*, the subgenus of *Odostomia*, which it resembles in sculpture, but no plication is shown or mentioned on the columella, and nothing is said of the nucleus. The lack of positive data concerning these characters kept me from referring it to the Pyramidellidæ.

I would be pleased to know upon what grounds Dr. Bush bases her contention of the synonymy of *Phasianella sulcosa* Mighels, and *Odostomia* (*Menestho*) *sulcata* Verrill; for Mighels' description and figure are entirely different from Professor Verrill's description, and Dr. Bush's figure of *Odostomia* (*Menestho*) *sulcata* Verrill.

Phasianella sulcosa Mighels, is represented much more inflated than *Odostomia* (*Menestho*) *sulcata* Verrill. *P. sulcosa* Mighels, has three incised spiral grooves between the sutures on each whorl, and three or four on the base, while *Odostomia* (*Menestho*) *sulcata* Verrill is represented as having five spiral grooves between the sutures and nine upon the base. A glance at the two figures alone is enough to convince one that they are not at all specifically related, and this deduction is verified by the description. I do not believe that the author of the latter species would agree to have his species put under

the synonymy of Mighels' *Phasianella sulcosa*. Under these circumstances, *Odostomia* (*Menestho*) *morseana* will have to do duty as stated in my text, p. 104.

I object emphatically to the lumping of *Odostomia bisuturalis* Say and *O. trifida* Totten. In the 1700 and more specimens that I have seen, I have no difficulty whatever in distinguishing them. It is true that *trifida* sometimes has the three suprasutural grooves poorly developed, but I have never seen them completely absent, as is the case with *bisuturalis*.

I also deny that there is any special relationship between *Odostomia* (*Menestho*) *bedequensis* and *Odostomia* (*Menestho*) *impressa* Say. The relationship of *Odostomia* (*Menestho*) *trifida* and *Odostomia* (*Menestho*) *trifida bedequensis* I believe is parallel to that between O. (*M.*) *bisuturalis* and *O.* (*M.*) *bisuturalis ovilensis*.

Dr. Bush questions whether I intended to use the word "spiral" in the fourth line of my description of *Odostomia* (*Menestho*) *impressa* Say. I did. "Spiral" is correct.

The specimen described and figured by me as *Odostomia* (*Odostomia*) *modesta* Stimpson, will have to be cited as *Odostomia* (*Odostomia*) *gibbosa* Bush.

Dr. Bush states (p. 482, last paragraph), "that the shell which is referred to *Odostomia* (*Odostomia*) *dealbata* Stimpson," is not the same as fig. 595, given in Binney–Gould, p. 327;" of the latter she says: "This, as indicated in a marginal note, represents a much larger and different species, which may be called *O. gouldii*, new name." Unfortunately, the name *Odostomia gouldii* was used by Dr. Carpenter in 1865, Ann. Mag. Nat. Hist., 3rd ser., XV., p. 30, for a West American species, and can therefore not serve in the present instance.

Summing up Dr. Bush's review I must say that nearly all the questions raised in it could have been settled better by correspondence than by discussion in print. It is somewhat unfortunate that Dr. Bush should not have published her paper written thirteen years ago, but I cannot see how this can now be helped. I have given all my spare time to this group since 1897, and hope, now that the West Coast is cleared up, to consider the Atlantic side of America.

The field is much larger than any one, who has given it less attention, would imagine. My card catalogue of described forms contains somewhere between 2,500 and 3,000 names, including recent and fossil species.

NOTES.

VIVIPARUS IN PHILADELPHIA.—A find which may be of interest to readers of the NAUTILUS was made by the undersigned a few weeks ago near Horticultural Hall in Fairmount Park. The species was *Viviparus contectus* (Mill.). It has not before been reported from Philadelphia, and as far as I know not from the State. The females were larger than the males and outnumbered them. Most of the adult females were pregnant. The sex was determined in 14 males and 39 females. In 18 specimens it could not be determined readily. The specimens are in my own collection and that of the Academy of Natural Sciences. The lily pond in which they were collected had just been restocked with plants, and Mr. Pilsbry, to whom I owe the identification, suggested that the snails had been introduced on the plants. Two years ago they were unknown in the same pond.—JOSHUA T. BAILY, JR.

We have to announce the death, July 28th, at Los Angeles, Cal., of Dr. R. E. C. Stearns, in his 82d year. Also, of Mr. William G. Binney, on July 25th, at his home, 222 East Union St., Burlington, N. J.

PUBLICATIONS RECEIVED.

A PRELIMINARY LIST OF THE UNIONIDÆ OF WESTERN PENNSYLVANIA, WITH NEW LOCALITIES FOR SPECIES FROM EASTERN PENNSYLVANIA. By DR. A. E. ORTMANN (Annals of the Carnegie Museum, Vol. V, pp. 178–210, 1909). An interesting review on the geographical distribution of the *Unionidæ* in Pennsylvania. Some 46 species are recorded from the Ohio River drainage, 17 from the Lake Erie drainage, and 14 from the Atlantic drainage.

THE DESTRUCTION OF THE FRESH-WATER FAUNA IN WESTERN PENNSYLVANIA. By DR. A. E. ORTMANN (Proc. Amer. Phil. Soc., Vol. 48, pp. 90–110, 1909). A paper of general interest to all zoologists, showing clearly with the aid of a map the great changes which have taken place in comparatively few years. Situated in the great oil and coal region, this section has suffered more than areas where the streams are only polluted by the sewage of the large towns and cities.

SHELLS OF MAINE, A CATALOGUE OF THE LAND, FRESH-WATER AND MARINE SHELLS OF MAINE. By NORMAN WALLACE LERMOND. An up-to-date list of the shells of Maine, containing 403 species and 38 varieties, with the principal synonymy and their distribution. The introduction contains a review of the work done by previous authors and others. Privately printed by the author at Thomaston, Maine.

DR R. E. C. STEARNS

THE NAUTILUS.

VOL. XXIII. OCTOBER, 1909. No. 5

A NEW BELA FROM FRENCHMAN'S BAY, MAINE.

BY KATHARINE J. BUSH, PH. D.

BELA BLANEYI, sp. nov. Fig. 1.

Type locality—South of Egg Rock buoy in about 30 fathoms mud and gravel, Frenchman's Bay, Maine.

Two dead specimens dredged by Mr. Blaney were recently sent me for identification. They are of especial interest as they prove to be unlike any species hitherto known from the American waters. The only one which they at all resemble is the *Bela incisula* Verrill (Transactions of the Connecticut Academy of Arts and Sciences, vol. V, p. 461, pl. xliii, fig. 12 and pl. lvii, fig. 14, 1882).

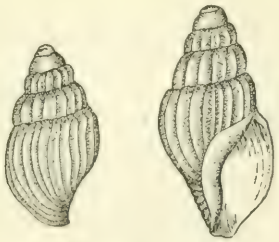


FIG. 1. BELA BLANEYI.

They differ from that species in having more elongated whorls and therefore appear more slender. The ribs are very little raised and are indicated rather by the deepened interspaces than by being raised above the general surface level along the shoulder which is roundly angulated; on some portions of the whorls these ribs blend entirely

with the sinuous lines of growth. The smaller specimen of four (4) whorls is destitute of spiral lines, either raised or incised, but the larger one of five (5) whorls has about fifteen (15) very faint incised spiral lines on the body whorl commencing well below the shoulder and are so shallow as to scarcely interrupt the otherwise smooth surface; there are also occasional faint indications of one or two spirals just above the suture on the preceding whorl. The one and one-half (1.5) nuclear whorls are well rounded and apparently smooth (this may be due to erosion) and regularly coiled. The epidermal layer has a delicate yellow tint.

The larger specimen measures 7 mm. in length by 3.5 mm. in width. The smaller, 5.5 mm. in length by 3 mm. in width.

I take much pleasure in naming the species in the honor of Mr. and Mrs. Dwight Blaney, of Boston, Mass., and Ironbound Island, Maine who have long been enthusiastic collectors and students of New England mollusks and have added much to our knowledge of the fauna.

Yale University, September, 1909.

LIST OF SHELLS FROM FRENCHMAN'S BAY, MAINE.

BY DWIGHT BLANEY.

The following list of additions to the shell-bearing Mollusks of Frenchman's Bay, is supplementary to the lists published in 1904 and 1906. (Proc. Bost. Soc. Nat. Hist., Vol. 32, No. 2, pp. 23–41, and NAUTILUS, Vol. XIX, No. 10, p. 110). The writer is indebted to Dr. K. J. Bush and Mr. C. W. Johnson for the identification of the various species.

Leda caudata, Lovén. One fine specimen.

Odostomia sulcosa (Mighels)= O. sulcata Verrill. (See K. J. Bush, Am. Journal Sci., Vol. XXVII, p. 475, 1909.)

We have dredged 20 specimens of this interesting species, the largest being 4 mm. long. Some with the distinct upturned nucleus most perfect.

Odostomia dealbata (Stimp.) Six specimens.

Bela decussata var. *pusilla* Verrill. (Trans. Conn. Acad. Vol. V, 1882, p. 481). A fine series dredged off Egg Rock.

NOTE.—Among our large series of *B. incisula V.*, we have found

considerable variation in the longitudinal sculpture, and have been able to arrange good series of a form *without any* longitudinal ribs, which seems worthy of being a good variety ; we have also arranged a good series of an intermediate form showing numerous ribs which grade into the typical form as described and figured by Prof. Verrill. (Trans. Conn. Acad., Vol. V, p. 461, pl. xliii, fig. 12.) We have good examples of the very young of all three forms, showing the subnucular whorls forming the characteristic sculpture.

Bela blaneyi Bush. Two specimens, one immature and one adult, (see previous article).

Philine lima (Brown) = *P. lineolata* Stimp. Two specimens dredged off Egg Rock, one alive.

Retusa obtusa Montg. var. *turrita* Möller. Six specimens.

NOTE.—We have been able this season to dredge fine specimens, both valves, of *Pecten islandicus* (Müller.), *Serripes grœnlandicus* (Gmelin), *Panomya norvegica* (Spengler), *Cyrtodaria siliqua* (Chem.), and *Cochlodesma leanum* (Conrad). Of all of which we had previously dredged only single valves.

A NEW LAND SHELL FROM BERMUDA.

BY H. A. PILSBRY AND E. G. VANATTA.

ZONITOIDES BERMUDENSIS n. sp. Fig. 1a, b, c, d.

The shell is broadly umbilicate, much depressed, with low convex spire and rounded periphery, glossy, yellow. First $1\frac{1}{2}$ whorls corneous, smooth, the rest distinctly, rather irregularly striate, the base a little smoother. Under the compound microscope very faint traces of minute spiral striæ may be seen, chiefly on the upper surface. Whorls $5\frac{1}{4}$, convex, slowly increasing, the last less convex below than in the peripheral region ; the umbilicus perspective, broadly open, one-third the total diameter of the shell. Aperture lunate, wider than high, but not much wider than the umbilicus.

Alt. 2.3, diam. 5.7 mm.; width of umbilicus 1.8, aperture 2 mm.

Church Cave, near Tuckers' Town, Bermuda. Types no. 91,152, A. N. S. P., collected by Mr. Stewardson Brown, 1905 and 1909.

This species has more whorls and a smaller apex than *Z. excavata* (Bean), it is more depressed, the last whorl is less convex beneath, and the umbilicus is larger. *Z. arborea* (Say) has invariably a

much smaller umbilicus than the Bermudian species, which is more depressed than *Z. nitida*, with a more open and perspective umbilicus.

This shell is abundant at the place mentioned, where it is associated with numerous other land shells, most of them native species. We have been unable to find any foreign species to which this may be referred. It seems to be indigenous. The generic reference has been verified by examination of the dentition, which has teeth of the type usual in *Zonitoides*. There are 6 lateral and about 17 marginal teeth (fig. 1*d*). The jaw is smooth, with a low median projection (fig. 1*c*). We found no dart in the two dried specimens examined, but this may have been due to their condition.

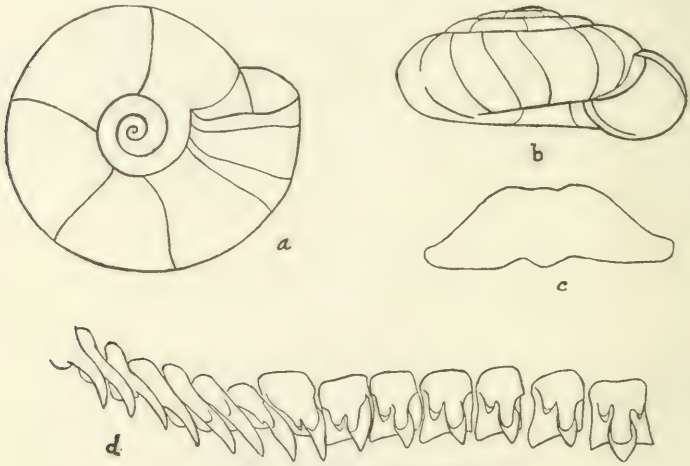


FIG. 1. *Zonitoides bermudensis.*

KALIELLA TURBINATA (Gulick).

Euconulus turbinatus Gulick, Proc. A. N. S. Phila., 1904, p. 420, pl. 36, figs. 8, 9, 10.

This species is abundant at Church Cave. An examination of the radula shows it to be a typical *Kaliella*. It resembles the Indian *K. fastigiata* (Hutton), but is distinct from that and all other known Indian species, according to Lieut.-Col. Godwin Austen, who kindly compared specimens with his great series of oriental species.

K. turbinata was described from sub-fossil examples from the lime-rock quarries. It is therefore not a recent importation; yet the presence of this oriental genus in Bermuda can hardly be accounted for except by the supposition of introduction with plants during the period of human occupation.

A NEW RISSOA FROM BERMUDA.

BY E. G. VANATTA.

RISSOA (NODULUS) STEWARDSONI, n. sp. Fig 1.

The shell is very minute, slightly rimate, thin, pale yellowish corneous, smooth, slender, regularly tapering from the last whorl to the very obtuse summit. Whorls $4\frac{1}{2}$, moderately convex. Aperture semi-rotund, subvertical, the peristome continuous, inner margin nearly straight, the outer regularly curved. Length 1.5, diam. 6.5, length aperture .55 mm.

Types No. 99041, A. N. S. P., from Fairyland, near Hamilton, Bermuda, near the shore, collected by Mr. Stewardson Brown, associated with *Melampus coffea* and *flavus*, *Leuconia occidentalis* Pfr., *Blauneria*, *Alexia*, *Detracia*, *Pedipes*, *Carychium*, *Cæcilioides*, *Bifidaria*, *Thysanophora*, *Polygyra microdonta*, and many other land shells.

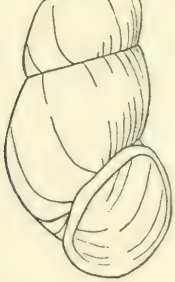


FIG. 1.

FIG. 2.

This tiny snail has the appearance of the terrestrial genus *Acme*. It is apparently a shore shell, as it was not found with any typically marine forms. It seems to be most closely related to the Mediteranean and Adriatic *R. epidaurica* Brusina, from which it differs by the more slender contour, more tapering spire and more convex whorls. *R. epidaurica* is decidedly more cylindrical. For comparison a figure is given (fig. 2) of a specimen of *R. epidaurica* received from Professor Brusina, from Ragusa, Dalmatia (No. 59,-898 A. N. S. P.) *R. glabrata* Muhlf. is more conical than *stewardsoni*, with the aperture more rounded.

DESCRIPTIONS OF TWO NEW SPECIES OF MUSCULIUM.

BY V. STERKI.

MUSCULIUM WINKLEYI, n. sp.

Mussel slightly inequipartite, high, well and regularly inflated, outlines along the valve edges well rounded to subcircular; posterior part higher and somewhat larger than the anterior, often subtruncate and with a slight postero-inferior angle; beaks little anterior, rather narrow, calyculate or plain, prominent; somewhat inclined towards the anterior; surface distinctly rugulose, dullish or somewhat shining, with comparatively coarse, sharp, subregular, crowded concentric striæ and some faint, shallow, irregular radial striæ; color horn to grayish or reddish, with one to a few narrow, darker zones along the lines of growth, straw to light yellowish in the young, and in marginal zones becoming obsolete in old specimens; shell thin, subtranslucent to opaque, hinge well curved, slight, cardinal teeth small, thin, laterals with short cusps; ligament rather short, covered; scutum and scutellum slightly but distinctly marked, rather long.

Long. 8.5, alt. 7.8, diam. 5.4 mm.

Soft parts not examined.

Habitat: Old Orchard, Me.; vicinity of Danvers, Mass.

M. winkleyi is not a variety or local form of some other species, but markedly different and decidedly distinct. It has some resemblance to forms of *M. securis* Pr., but is higher, with more rounded outlines, the hinge margin is more curved, the difference of size and shape between the anterior and posterior parts is less marked; in *securis* the posterior part is more truncate and less obliquely so to the dorso-ventral line. All these differences are especially well marked in half-grown specimens.

It is somewhat variable: some specimens seen (years ago) from Old Orchard were 10 and 10.5 mm. long; those seen from Danvers are somewhat smaller and slighter, with slighter surface striæ, some of them of a little more angular outlines posteriorly.

The type lot is No. 1396 of my collection of *Sphæriidæ*,[1] from Old Orchard, Me.,[2] collected and sent in 1896 by the Rev. H. W. Wink-

[1] Now of the Carnegie Museum.

[2] There is no doubt that specimens from the same place are in various other collections as *M. securis cardissum* or as "?."

ley, in whose honor the species is named, and who has collected specimens of all stages of growth at various places in the vicinity of Danvers (Nos. 5343, 5355, 5356).

MUSCULIUM PARVUM, n. sp.

Shell small, inequipartite, oblique, medium inflated ; margins generally rounded, or with a slightly marked angle at the junction of the superior margin with the obliquely subtruncate posterior ; anterior part of the mussel much smaller than the posterior ; beak somewhat anterior, little prominent, broad, calyculate or plain (form æstivalis) ; surface shining, with slight, irregular striæ ; shell very thin and fragile, transparent to translucent, colorless to pale corneous ; hinge very slight, cardinal teeth nearly straight longitudinally, the left posterior above the anterior, which is strongly curved up.

Soft parts colorless (except for the tan of the liver), also the siphons and mantle edges ; siphons short, very shortly connected when extended, the branchial wide ; foot strongly folded at the sole, when emerging.[1]

Long. 4.7, alt. 4, diam. 2.8 mill. (average).

Habitat : Ohio ; a swamp near Uhrichsville ; also in Stark and Summit Counties, collected by the writer, 1906–'09. Types no. 5408 of my collection of Sphæriidæ.

The first specimens were doubtfully ranged under *M. securis* Pr.; but with the latest ones, and their soft parts, it became evident that they are distinct ; they are smaller, the superior margin is less curved, the posterior is more rounded and more oblique, the surface shining, the shell colorless, while in *securis* it is generally yellow ; the siphons are much shorter and very shortly connected, colorless ; in *securis* they are yellow to orange or salmon or reddish.—*M. sphæricum* Anth., so far as known,[2] is larger, the beaks are narrow and much more prominent.

---

[1] This may not be a specific feature.

[2] The two specimens (four loose valves, the third in the lot is a young *Sphærium occidentale* Pr.), in the T. Prime collection, No. 10 (conf. 1895 catalogue) and ranged under *securis*, are hardly sufficient for establishing a species ; the one in the National Museum, No. 11612, is rather different ; in the Anthony collection no specimens were found.

ON COLLECTING.

BY REV. HENRY W. WINKLEY.

"I wish I had my life to live over again" is a frequent expression. The writer has no such desire, but I could have done better work formerly if I had had the experience, and I wish I could give my experience to others.

Dr. Sterki has in a recent article in the NAUTILUS, mentioned some methods of work. A visit from that veteran worker a few months ago was of great help to me. As a result I have collected more materials this year than I have in any half-dozen years formerly. My outfit is simple. Rubber boots, a net of scrim, frame of steel wire so made that there is one foot straight as a scaping surface, a bamboo pole in two joints. A large sieve of fine grain, small bags of kakki and one or two jars. All can be carried on a bicycle. With this outfit I have gone from my home on trips lasting from one to two hours, and returned with from one to two thousand specimens of Pisidium, Planorbis, Amnicola, etc. The same outfit serves for much of the marine work. The importance of "when you're gittin, git" is realized when one returns with one or two thousand specimens and finds two or three very rare forms among them. Mud is my delight in fresh or salt water. It is swarming with life. Eel grass is another rich field. Dip and sift dry and examine with a lens; the tiny chaps are easily overlooked.

Our work is a labor of love, many of our best collectors have limited means, often limited time. Though the writer has at times employed a sail boat for dredging, and results have been excellent, all the new species turned up in New England during the last twenty years, have been obtained either by trips on foot or from a row boat. It requires hard work to dredge from a row boat, but it can be done. Rare species of Pyramidellidae have all been obtained in that way, but don't be afraid of mud. A list of Prince Edwards Island species, some new—others not before known in Canadian waters has proved a valuable contribution. I never was anywhere near that island. The materials all came from mud washed from the oyster shells, miles away from their home. At present the writer is busy with marine mud in a sheltered bay. Reports will come later, but rare forms with one species that may prove new, are already before me. New England needs more workers, and it is full of surprises, espe-

cially when one considers how much can be found with a simple outfit, and a few ounces of energy. No doubt the same is true of the whole country. A person once said to the writer "your hobby is the most fascinating I know. Every one admires shells." Perfectly true, but far too many are afraid of mud. I don't know of any success without a bit of the disagreeable work.

THE LAND MOLLUSCA OF ALDABRA.

BY MAXWELL SMITH.

Mr. E. Dupont, who is now residing at Hell Bourg, Reunion, has been fortunate in obtaining specimens and information of this group. The Aldabra Islands are situated in the Indian Ocean to the north of Madagascar and between the Conoro and Mascarene groups. Not many years ago the land mollusca of Aldabra were unknown, in fact not a single species had been recorded from the islands. Mr. Dupont writes me as follows. Aldabra was visited by an American, Dr. W. L. Abbott, in 1892, who published an account of the birds in the Proceedings of the U. S. National Museum for 1895.

The island was visited by a German, Dr. Vodtykon in 1895, accounts of which were published. I do not think that these mention land shells. In September, 1906 my cousin, Mr. R. Dupont, Curator of the Botanical Station at Victoria, Mahe, Seychelles, investigated these islands on behalf of the Seychelles government. He collected the shells which I now send to you.

At last, quite recently an English naturalist, Mr. Fryers, has been staying there during several months; to complete the geological observations made by Prof. Sardina, on the separation of the islands in the Indian Ocean.

So now the natural productions of this island, which was for long a terra incognita, will now be fairly known. Judging from the shells, it has more affinities with the Comoro Islands than with the Mascarene.

The shells known are as follows:

Ennea sp. Grande Terre. The Picard. Iles Vertes. Closely allied to the common *E. dentiens*. May prove to be new.

Kaliella aldabraensis, n. sp. To be described by Col. Godwin Austin.

Rachis aldabræ Mart. A beautiful shell of the Comoro type. The most common of all the species from Aldabra. Mostly found on Picard Island. 200 metres from the sea.

Succinea mascarensis? Nevill. Larger and more strongly striated than the Mascarene specimens.

Assiminea sp. Perhaps *A. hidalgoi* Gass.= *granum* Morelet. Grande Terre. The Picard. Iles Vertes.

Cyclostoma sp. Plaine Cubi. A *Ligatella* or *Otopoma*. It seems to be a new species, but too much worn for description. Better specimens came in Sardina's collection.

Truncatella valida Pfr. Grande Terre. The Picard. Iles Vertes,

Isidora sp. Perhaps *I. forskali* Chr. = *Physa cernica* Morelet. from Mauritius. The presence of this fresh-water shell at Aldabra is very curious, the only spot provided with fresh water being a spring at Tata maca.

DR. R. E. C. STEARNS.

Dr. Robert Edwards Carter Stearns died at Los Angeles, Cal., July 27, in his eighty-third year. He was a native of Boston, Mass., a son of Charles Stearns, and was born February 1, 1827. He was educated in the schools of his native city, followed by a course of mercantile training, and from his earliest years evinced a deep love of nature, fostered by his father, with whom similar tastes led to a degree of comradeship in rambles and hunting expeditions which he always remembered with appreciation. The boy had an unusual artistic ability, and though his early avocations were services in a bank and on a farm, when only twenty-two years of age he painted a panorama of the Hudson River from the mouth of the Mohawk to Fort William, which he exhibited with much success. He turned his attention to mining, explored the coal fields of southern Indiana, and in 1854 was appointed resident agent of several copper mines in northern Michigan on Lake Superior. In 1858 he went to California, where he became a partner in the large printing establishment of a brother-in-law of his wife, in San Francisco. This firm published the *Pacific Methodist*, a weekly religious paper, and in the troubled times preceding the Civil War the reverend editor of this journal was obliged to visit the East. Stearns was requested to fill this place during his absence. The fate of California hung in the balance; many of the immigrants from the Southern States urged

independence for that territory when hostilities broke out. Stearns took the responsibility of making his paper an enthusiastic advocate of the Union cause, and to this call and the eloquence of Thomas Starr King, old Californians believed, the decision of the people to stand by the Union in that struggle was due in no small degree. Through the influence of Justice Field, Stearns was appointed deputy clerk of the Supreme Court of California in 1862, a post which he resigned in the following year to accept the secretaryship of the State Board of Harbor Commissioners, which he was obliged to resign some years later on account of ill health. Coming to the East, he made one of a party, comprising beside himself the late Dr. William Stimpson and Col. Ezekiel Jewett, for the exploration of the invertebrate fauna of southwestern Florida, during which large collections were made for the Smithsonian Institution. He returned to California, and in 1874 was elected secretary to the University of California, being the business executive of that institution under the presidency of the late Dr. Daniel C. Gilman. He served in this capacity for eight years with great approval, and when ill health again obliged him to retire from service, the University, as expressive of their sense of his services to the cause of education in California and in recognition of his scientific attainments, conferred upon him the degree of Doctor of Philosophy. Returning to the East after the death of Mrs. Stearns, he was engaged in researches for the U. S. Fish Commission in 1882, was appointed paleontologist to the U. S. Geological Survey by Major Powell in 1884, and assistant curator of mollusks in the National Museum by Professor Baird. His collection of mollusca was acquired by the Museum. Age and infirmity obliged him to return to the more genial climate of California in 1892, where he settled in Los Angeles, continuing, as his strength permitted, his researches into the malacology of the Pacific coast. He married, March 28, 1850, Mary Anne Libby, daughter of Oliver Libby of Boston, and is survived by a daughter.

Dr. Stearns was an earnest student of mollusks from boyhood; his early experience led him to interest himself in horticulture and landscape gardening, and his ability in this line is attested by the beauty of the University grounds at Berkeley, which were developed under his superintendence. His knowledge of the Pacific coast mollusca was profound, and a long list of papers on this topic and on the shells of Florida was the result. He also contributed many papers

on various branches of horticulture and gardening to the California periodicals devoted to this subject. He was an enthusiastic supporter of the California Academy of Sciences in its early days, and after the earthquake of 1868, when disaster threatened the Society, he, with Professor J. D. Whitney and a few other friends, stood between it and dissolution. He was a member of numerous scientific societies at home and abroad, and of the Sons of the Revolution.

Dr. Stearns was a man of sanguine temperament, with a lively sense of humor and high moral character. His reading was wide, his learning never obtrusive, his interest in art, literature and all good causes intense. He was a staunch friend and, for a righteous object, ever ready to sacrifice his own material interests. His services to Californian science will keep his memory green.

Wm. H. Dall.

LUDWIG RUDOLPH SOPHUS BERGH.[1]

Dr. Bergh was born in Copenhagen, October 15, 1824, and died in the same city July 20, 1909. Dr. Bergh for many years stood at the head of the small group of malacological anatomists, devoting himself especially to the Opisthobranchiata and particularly to the Nudibranchiata. His published works on these animals form a small library and a mine of detailed information. The chief results of this unremitting labor are summed up in a large quarto in which he gives a complete systematic arrangement for these animals. Besides this contribution to the knowledge of molluscan anatomy he published several valuable memoirs on other groups of mollusks, an especially notable instance being a fine memoir on the anatomy of the genus *Conus*. He was largely concerned with the publication of the great posthumous series of quartos detailing the results of the researches in eastern seas by Carl Semper, who was his intimate friend. In medicine also his publications, based on the treatment of thousands of hospital patients, took a high rank.

Personally, Dr. Bergh was most genial and agreeable in manner, ever ready to help younger students, or serve as cicerone to foreign colleagues visiting his beloved Copenhagen. Hospitable and unpretentions, a staunch friend and untiring student, his death leaves a gap in the ranks of the veterans which we may hardly hope to see filled, and a memory which those who knew him will cherish long.

[1] Abridged from the obituary notice by Dr. Wm. H. Dall (Science, XXX, p. 304, Sept. 3, 1909).

BEAR LAKE, CALIFORNIA.

THE NAUTILUS.

VOL. XXIII. NOVEMBER, 1909. No. 6

THE KNOWN MOLLUSCA OF SAN BERNARDINO COUNTY, CALIFORNIA.

BY S. S. BERRY.

In light of the fact that accurate data bearing on the geographical distribution of Californian land and fresh-water mollusca are still few and far between, it seems best to publish such items as may be accumulated from time to time, and in this connection the following notes (the result of several years desultory observation) may be of interest.

The district under present consideration comprises one of the largest, if not the largest, counties in the United States, being more than equal in area to any one of a number of our smaller States. By far the greater portion of its area is swallowed up by the vast Mojave and Colorado Deserts, and even at this late date is still almost an absolute terra incognita so far as the mollusca are concerned. Of necessity, therefore, the present paper treats almost exclusively of the extreme southwestern corner of the county alone, namely, the so-called San Bernardino Valley, with the adjacent San Gabriel and San Bernardino Ranges of mountains which confine it on the north and shut it off from the desert and the remainder of the county. Even for this circumscribed district, the present list makes no pretensions to completeness, but is offered merely as a résumé of our present knowledge, with the hope that it may lead to further investigation. Doubtless more than one interesting form still awaits its discovery by some diligent collector, especially in the mountain regions (see NAUTILUS XXI, p. 121, and below).

It is interesting to note that the above-mentioned valley is practi-

cally the only portion of the entire county which drains directly into the Pacific, and that, thanks to the fertile character of its soil and the water available for its irrigation from the neighboring mountains, almost the whole population of the county is concentrated here, notably in the cities of Redlands, San Bernardino, Ontario, Chino, and Colton. All are garden spots, and by the unwitting agency of man most of them have come to possess a fairly extensive molluscan fauna, many species of alien origin being now far more numerous than any of the native forms.

There have been few previous records for any of the localities of the region. Binney ['85] gives one or two species as being found in the county, but at least one of his records is without doubt erroneous. Stearns ['93] is the next author to report on specimens from our area, and his records are about all we have from the great desert region. The few records since that time are listed at the end of this paper.

My thanks are due to Dr. R. H. Tremper, of Ontario, who has generously supplied me with numerous specimens and data regarding the fauna of his immediate neighborhood. Practically all of his records are new and very interesting. I am also under obligations to Miss Nina G. Spaulding, of Redlands, whose enthusiastic efforts have aided not a little in increasing our knowledge. Data supplied through her or through Dr. Tremper are so noted by the use of their initials. I am also indebted to Mr. Sanford B. Dole, of Riverside, for the use of the accompanying photograph.

List of Species.

Helix aspersa Müller. Occasional around greenhouses at Redlands, but evidently not yet thoroughly at home.

Epiphragmophora traski (Newcomb). "Under dry leaves in small foothill cañon near Ontario" [R. H. T.]; also in San Antonio Cañon, two miles from mouth, elevation 2500 feet [R. H. T., April 4, 1908]; under leaves, Stoddard's Cañon, elevation 2500 feet [R. H. T., 1909].

This coast species apparently just enters the county as I have not encountered it even in the upper end of the San Bernardino Valley.

Epiphragmophora tudiculata (W. G. Binney). Mentone, under hedges; Highland, by the roadside after a rain; Arrowhead, Hot Springs; San Bernardino and vicinity; greenhouse in same city [R. H. T.]; Ontario, under stones and woodpiles [R. H. T., 1908–

1909]; also southeast of Ontario, some seven miles from the foothills [R. H. T., March, 1909]; Frankish Cañon, under stones, altitude 2500 feet [R. H. T., April 1, 1908]; at mouth of Stoddard's Cañon, at same elevation, under stones [R. H. T., 1909].

Specimens found by Dr. Tremper in January, 1908, in an orange grove at Ontario are particularly beautiful examples of the species, some showing a curious tendency toward albinism.

Vallonia pulchella (Müller). Redlands, common in greenhouses [S. S. B., 1903, '04, '06, '08].

Vertigo occidentalis Sterki. Bluff Lake, altitude 7,550 feet, 1907 (one specimen only) [S. S. B.]; in 1908 quite common in *spots* in the big Bluff Lake cienaga, in the cienaga just north, and along the "New England Trail," altitude 7,500 feet; also a few specimens in a cienaga west of Green Valley, altitude 6,900 feet [S. S. B.]. Many more specimens were sent from Bluff Lake during the present summer by Miss N. G. Spaulding.

Evidently an abundant species in the more Alpine regions of the San Bernardino Mountains, and I suspect that this or a closely allied form will also turn up in similar localities in the neighboring San Gabriel and San Jacinto Ranges.

Vertigo sp. Another form occurs with *V. occidentalis* in the neighborhood of Bluff Lake [S. S. B., Aug., 1908; N. G. S., Aug., 1909].

Vertigo rowelli (Newcomb). San Bernardino [Binney, '85, p. 156]. At best a doubtful record.

Vitrina alaskana Dall. San Bernardino Mountains—a common species at Bluff Lake and vicinity [S. S. B., Aug., 1907, Aug., 1908; N. G. S., Aug., 1909]; cienaga west of Green Valley [S. S. B., July, 1908]. Especially abundant under *willow* trees at the edges of a meadow.

Vitrea cellaria (Müller). In greenhouses, Redlands [S. S. B., 1904–'08].

Euconulus fulvus (Müller). Cienaga west of Green Valley [one specimen, S. S. B., July, 1908]. Altitude 6,900 feet. Bluff Lake Meadow (altitude 7,550 feet) and the neighboring cienages [S. S. B., Aug., 1907, Aug., 1908 (abundant); N. G. S., Aug., 1909 (abundant)]. Near mouth of Mill Creek Cañon [one specimen in drift, S. S. B., July, 1908]. Forest Home, altitude 5,200 feet, a colony of about 20 live individuals found by the writer under sticks on the bank of Mill Creek, June 12, 1909.

"San Gorgonio Pass" [Binney, '85, p. 68]. The exact locality of Binney's specimens is doubtful, but not of great importance as this is evidently a common mountain species, occurring throughout the San Bernardino Range. I have as yet seen no specimens from the San Gabriels.

Zonitoides orea (Say). Mouth of Stoddard's Cañon, near Ontario, under leaves [R. H. T., 1909]. Redlands, in greenhouses [S. S. B., 1904–1908]. Bluff Lake [S. S. B., 1907]; Bluff Lake and cienaga just north [S. S. B., Aug., 1908—ten specimens]; several specimens, same locality [N. G. S., Aug., 1909].

Zonitoides milium (Morse). Greenhouse, Redlands, one specimen [S. S. B., 1904].

Zonitoides minuscula (Binney). Greenhouse, Redlands [S. S. B., 1904].

Limax maximus Linnaeus. Redlands, in greenhouses in 1904 [S. S. B.]; now abundant about houses and in yards everywhere. Reported from same locality by Bartsch ['04, p. 12].

Ontario [R. H. T., 1908, 1909]. The last specimens sent me by Dr. Tremper were the most light-colored of the species I have seen in California.

Limax flavus Linnaeus. Redlands, with *L. maximus* [S. S. B., 1904].

Pyramidula cronkhitei (Newcomb). Cienaga, north of Bluff Lake Meadow, San Bernardino Mountains, altitude 7,500 feet [S. S. B., 16 specimens, Aug., 1908; N. G. S., Aug., 1909, abundant].

Punctum californicum Pilsbry. Occasional in Bluff Lake Meadow under sticks [S. S. B., Aug., 1908]; Cienaga, north of Bluff Lake, altitude 7,500 feet, not rare [S. S. B., Aug., 1908; N. G. S., Aug., 1909]. Being in doubt as to whether these specimens were correctly referred to this species, examples were sent to Mr. Bryant Walker, who confirmed the identification.

Punctum conspectum (Bland). Near Green Valley, San Bernardino Mountains, altitude 6,900 feet, 3 specimens [S. S. B., July, 1908]; Bluff Lake, one specimen [S. S. B., Aug., 1908].

Succinea oregonensis Lea. Lower end of the big Cienaga at Bluff Lake along the "New England Trail," 18 specimens [S. S. B., Aug., 1908] 13 specimens [N. G. S., Aug., 1909].

Lymnæa palustris (Müller). Bear Lake, altitude 6,700 feet, San Bernardino Mountains, abundant [S. S. B., 1907, 1908].

Lymnæa palustris nuttalliana (Lea). Creek and swamp at Bluff Lake, altitude 7,550 feet, abundant [R. D. Williams, 1905; S. S. B., 1907, 1908; N. G. S., 1909]. These specimens very uniform in appearance. Bear Lake, intergrading with typical (?) palustris, common [R. H. T., Aug., 1902; S. S. B., Aug., 1907, 1908].

Lymnæa humilis modicella (Say). On flower pots in greenhouses, Redlands, abundant [S. S. B., 1904–'08].

Lymnæa caperata Say. A single very juvenile specimen collected by Dr. Tremper in a pool in San Antonio Creek, 2 miles from mouth [April 4, 1908], was identified as this species by Mr. F. C. Baker.

Lymnæa bulimoides Lea. Mojave River, near Daggett [Stearns, '93].

Physa gyrina (Say)? Redlands, in irrigating ditches; Garlick Springs [Stearns, '93]; Daggett [Stearns, '93].

I suspect that most if not all the Southern California records of *P. gyrina* need re-examination, and the above will more than likely prove to be varieties of *P. virginea* Gould.

Physa lordi Baird. Artificial pond, Ontario, the water of which comes from Hermosa Cañon [R. H. T.]. Specimens of this fine large species were sent to Mr. F. C. Baker, who agrees with me in referring them to *P. lordi*.

Physa virginea Gould. Ditches and reservoirs in Redlands, common [S. S. B., 1907, 1908].

Physa virginea traski Lea. Main irrigating ditch of Ontario, near mouth of San Antonio Cañon, altitude 2,200 feet [R. H. T.].

Physa cooperi Tryon. Watering trough in City Creek Cañon, San Bernardino Mountains [S. S. B., Aug., 1907, July, 1908]; Bear Lake, altitude 6,700 feet [S. S. B., Aug., 1907–'08].

Physa politissima Tryon. Bear Lake, altitude 6,700 feet, not uncommon [S. S. B., 1907, 1908].

Dr. Pilsbry, to whom I sent specimens of this and the preceding species, and to whom I owe their determinations, wrote as follows: "It should be said that the synonymy of West Coast Physas has never been worked up, and the ultimate names which will be used cannot now be decided, but your specimens correspond closely to the *type lots* of the forms mentioned, whether these be species or varieties."

Planorbis trivolvis Say. England's Park, Redlands; swamp and creek at Bluff Lake [S. S. B., 1907, 1908; R. D. Williams,

1905]; Bear Lake [R. H. T., 1902; S. S. B., 1907, 1908]; Daggett [Stearns, '93].

Planorbis parvus Say. Mojave River, near Daggett [Stearns, '93]; Swamp at Bluff Lake [S. S. B., 1907, 1908]; Bear Lake [S. S. B., 1907, 1908].

The specimens from Bear Lake were identified by Dr. Dall as *P. vermicularis* Gould. They certainly have a slightly different aspect from the Bluff Lake specimens, but I doubt if they are distinct.

Paludestrina stearnsiana Pilsbry. Rill near mouth of Mill Creek Cañon, San Bernardino Mountains, very abundant in July, 1908 [S. S. B.], but a rather hasty search in the same locality one year later did not yield a specimen.

Mountain Home Creek, San Bernardino Mountains, altitude 3,600 feet [S. S. B., July 11, 1909].

[*Paludestrina protea* Gould. In numerous collections I have seen large series of this species in a subfossil condition which were distributed some years ago by an unknown collector as from the "Mojave Desert." They are probably from San Bernardino County, so I record them here, although "Colorado Desert" may have been what the label meant. As the species is known to exist in Inyo and Riverside Counties, it may reasonably be expected to turn up in the living condition in this county as well.]

[*Valvata lewisii* Currier. San Bernardino Mountains, Cal. [fide Dall, '05, p. 123; also see Walker, '06, p. 26].

I have not seen any of Dall's specimens, but I have no doubt whatever that they really represent not *V. lewisii*, but the following form:]

Valvata humeralis californica Pilsbry. Swamp at Bluff Lake, altitude 7,550 feet [S. S. B., Aug., 1907, 1908; N. G. S., Aug., 1909—not very abundant].

Bear Lake, altitude 6,700 feet, the type locality [S. S. B., Aug., 1907, 1908].

For this form beside the references given above under *V. lewisii*, see Berry, '08, p. 122, and Pilsbry, '08, p. 82.

Anodonta californiensis (Lea) var. Chino Creek. S. of Ontario [R. H. T., 1908].

Musculium raymondi (J. G. Cooper). Swamp and creek at Bluff Lake, large and abundant in 1905 [R. D. Williams]; very common but small in 1907 [S. S. B.]; more rare in 1908 [S. S. B.] and 1909 [N. G. S.]; apparently being replaced by the following species.

Pisidium californicum (Newcomb ?). Swamp and creek at Bluff Lake, common in 1907 [S. S. B.], abundant in 1908 [S. S. B.], and 1909 [N. G. S.].

Pisidium ashmuni Sterki. Swamp at Bluff Lake [S. S. B., 1907]. Identified by Dr. Sterki.

Specimens of *Pisidia* have also been found in Kid Creek, San Bernardino Mountains [N. G. S., Aug., 1909], and in Mill Creek at Forest Home, altitude 5,200 feet [S. S. B., July, 1908], but have not as yet been determined by Dr. Sterki.

Bibliography.

Bartsch, Paul. *Limax maximus* L. in California. Nautilus, XVIII, p. 12, May, 1904.

Berry, S. S. Molluscan Fauna of the San Bernardino Mountains, California. Nautilus, XXI, p. 121, March, 1908.

Binney, W. G. A Manual of American Land Shells. Bull. U. S. N. M., No. 28, 1885.

Dall, W. H. Alaska—Land and Fresh Water Mollusks. Harr. Alaska Exp., Vol. XIII, N. Y., 1905.

Grinnell, Joseph. Biota of the San Bernardino Mountains. Univ. Cal., 1909.

Pilsbry, H. A. Notes on Plate XI. Nautilus, XXI, p. 133, April, 1908. *Valvata humeralis californica*, n. subsp. Nautilus, XXII, p. 82, Dec., 1908.

Stearns, R. E. C. S. Report on the Land and Fresh-Water Shells Collected in California and Nevada by the Death Valley Expedition, Including a Few Additional Species Obtained by Dr. C. Hart Merriam and Assistants in Parts of the Southwestern United States. N. Amer. Fauna, No. 7 (U. S. Dept. Agric.), May, 1893.

Sterki, Victor. A New Californian Vertigo. Nautilus, XXI, p. 90, Dec., 1907.

Walker, Bryant. Notes on Valvata. Nautilus, XX, p. 25, July, 1906.

RANGE OF LYMNÆA UMBILICATA.

BY FRANK C. BAKER.

This recently recognized and very distinct species has been reported from a number of rather widely separated localities. Its range would seem to be from Ontario and Northern Maine west to southeastern Michigan and south to New Jersey. It has doubtless been identified as *humilis* and will be found in many collections under this all embracing name. *L. umbilicata* is not a race of *L. cubensis*, as suggested by Mr. Walker, but a distinct species, the radula having tricuspid laterals where those of *cubensis* are bicuspid.[1]

The known records are as follows:

United States.

Connecticut: Small stream emptying into Farmington River, Unionville, Hartford Co. (Baker).

Maine: Buckfield, Oxford Co. (J. A. Allen); Woodland, Aroostook Co. (Nylander); Fox Island, Penobscot River, Knox Co. (Jackson).

Massachusetts: New Bedford, Bristol Co. (Adams); Brook near Cabot's Park, Newton; Charles River above Watertown, Middlesex Co. (Baker); Swampscott, near Lynn, Essex Co. (Tufts); Southborough, Worcester Co. (Bos. Soc., N. H.); Salem, Essex Co. (True); Essex Co. (Russell); Westfield, Hampden Co. (Smith. Coll.).

Michigan: Otter Lake, Lapeer Co. (Walker).

New Jersey: Drainage ditches east of Burlington, Burlington Co. (Baker; Pilsbry).

New York: Maplewood Park, Rochester, Monroe Co.; South end Cayuga Lake, near Ithaca, Tompkins Co. (Baker); Charlotte Lake, Columbia Co. Lea).

Rhode Island: The Fountain, Pawtucket, Providence Co. (H. F. Carpenter); Rhode Island (Walker).

British America.

Ontario: Ottawa, Carleton Dist. (Heron); Carleton Co. (Walker).

[1] See Mr. Walker's excellent article in Ottawa Nat., XXII, page 89, for the distinguishing characteristics of *L. umbilicata*.

THE MOLLUSCA OF DOUGLAS COUNTY, KANSAS. GASTEROPODA.

BY G. DALLAS HANNA.

As one travels westward from the Mississippi River, the gradual diminution of the forest growths is very apparent. Tracts of timber get smaller and smaller and the trees become more stunted in growth until when the middle of Kansas is reached there are only a few cottonwoods, confined to a narrow belt along the banks of streams. Eastern Kansas is then a transition zone, where the timbered regions of the east fade gradually into the vast semi-arid plains of the southwest.

A botanical condition such as this is bound to have a very great influence upon a group of animals as closely associated with vegetable growths as the land mollusks are. We find some species—as the majority of the Polygyras for instance—extending only as far west as the trees go. Moisture and shade are requisites to their existence, and we find them becoming rarer in direct proportion to the decrease in vegetation. They have migrated westward just as fast but no faster than the trees.

And on the other hand there are some species of the plains area which do not extend appreciably into the timbered regions. On the border-line then, as we would expect, we find an intermingling of the two faunas.

Douglas County is a typical border county. Trees exist in little patches here and there but are mostly confined to the near vicinity of streams. Mollusks are not plentiful and generally distributed, but are addicted to living in colonies in the patches of trees.

Among the most important tracts of timber conchologically is Blue Mound, situated six miles southeast of Lawrence. This little hill which rises two hundred and fifty feet above the river flood plain, supports an excellent growth of small trees. Under the dead leaves and loose stones the small snails are to be found more abundant than any place else in the county.

The outcropping limestone ledges furnish several species which belong in general to the southwestern plains fauna. *Bulimulus dealbatus*, *Vallonia parvula*, *Bifidaria procera* and *Zonitoides singleyana*, are abundant in some such localities where there are no trees for miles.

Localities favorable for fresh-water snails are rare. The only

bodies of standing water in the county are small, and with one or two exceptions are artificial ponds. Horseshoe Lake and Lake View are natural basins but both are small and contain but few mollusks. The small streams emptying into the Kansas River contain a few shells very locally distributed. The River is too sandy for these animals.

The family *Ancylidæ* seems not to have a representative in these waters.

Very little collecting previous to 1908 has ever been done in Douglas County. *Polygyra m. chadwicki*, a dentate variety of *Polygyra multilineata* was described by Ferriss in the NAUTILUS for August, 1907, from specimens collected along the Kansas River at Lawrence. Aside from this one reference I have never found the shells of this county alluded to. Therefore I append the following list, based upon two years' collecting in which the entire county has been thoroughly searched. Probably not many more species will be collected. Four or five are withheld from this list because of uncertain identification.

Dr. V. Sterki has examined the *Pupidæ*, and Mr. F. C. Baker, the Lymneas, to both of whom I am very grateful.

Polygyra profunda Say.

Polygyra albolabris alleni Wetherby.

Polygyra multilineata Say.

Polygyra multilineata chadwicki Ferriss.

Polygyra divesta Gould. A single specimen found in drift along the Kansas River at Lawrence.

Polygyra clausa Say. With the exception of *P. profunda* and *P. albolabris alleni*, which range into Shawnee County on the west, Douglas County marks the extreme western range of the Mesodons. All the species are rare in this locality, and are found on the northern shaded slopes of hillsides which have limestone outcropping.

Polygyra dorfeuilliana Lea. Dead shells were found under conditions such that the species must be living here.

Polygyra monodon Rackett. This form lives on Blue Mound.

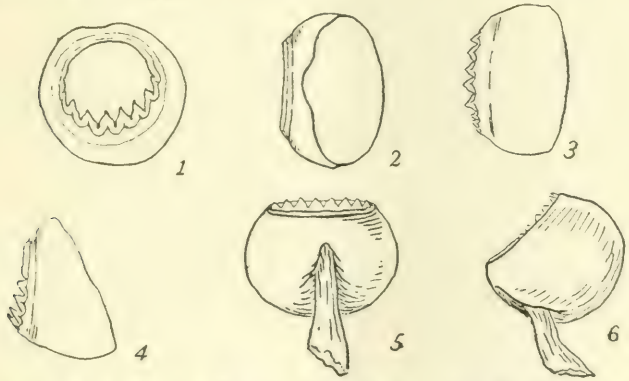
Polygyra fraterna Say. The common Polygyra of Kansas. Found everywhere.

Polygyra fraterna aliciæ Pilsbry. Occasionally found with *P. fraterna*.

(*To be continued.*)

NOTES.

SUCKERS FROM THE BIG SQUID.—On visiting Provincetown in August I made inquiries regarding the Giant Squid taken the last of March, 1909, off Highland, Truro, Mass., and mentioned in THE NAUTILUS for July, 1909. I was unfortunate in not securing the beaks which had been thrown away, but I saw the $7\frac{1}{2}$ foot tentacle, which was preserved in dry salt. I obtained the cartilage of one of the suckers, and, with permission from the owner, cut off one of the suckers about mid way on the tentacle. As this is the only specimen taken in Massachusetts I have thought it might be of sufficient interest to the readers of THE NAUTILUS for me to give sketches to show the shape of this cartilage and the curious arrangement of the serration of the margin.



Figs. 1, 2, 3, 4 are different views of the cartilage of one specimen, while Figs. 5 and 6 are the views of a sucker cut from the middle of the tentacle. All figures are magnified twice.

The tentacle is now in the possession of a gentleman in Provincetown, Mass.—J. HENRY BLAKE.

HOMALOGYRA ATOMUS IN RHODE ISLAND.—In a recent number of the NAUTILUS I mentioned the discovery of *Homalogyra atomus* on the New England coast at Hampton, N. H. It was first discovs ered by Philippi in Sicily; since then it has been found in other parts of the Mediterranean, Norway, England and France, but this is the first time it has been recorded on this side of the Atlantic. Miss M. W. Brooks has lately found this species in shell sand, from

Newport, R. I. Its occurrence north and south of Cape Cod indicates a somewhat wide distribution of the species.—Edward S. Morse.

Joseph F. Whiteaves.[1]—Dr. Joseph Frederick Whiteaves, the distinguished Palæontologist of the Canadian Geological Survey, died on the 8th of August, 1909, after an illness of several months.

Dr. Whiteaves was born in Oxford, England, in 1835, and first came to this country in 1861 on a short visit, returning the following year to make his residence in Montreal, Canada, where for twelve years he was officially connected with the Montreal Natural History Society. In 1876 he was appointed Palæontologist of the Geological Survey to succeed the late Mr. E. Billings.

His works on the palæozoic and mesozoic fossils of Canada are monumental, and the broad scope of his work both in palæontology and zöology can only be appreciated by a perusal of his numerous papers which number nearly 150, in which over 450 new genera, species and varieties are described.

Dr. Whiteaves was of a generous and kindly disposition, always ready to aid and impart information. He was an ideal type of a man imbued with the professional spirit, striving for the best results, not satisfied with half measure, and ever urged on by the love of his work.

Miss J. E. Linter.—We regret to announce the death of Miss J. E. Linter which occurred on August 30, 1909, at Twickenham, England. Her valuable collection of shells will be offered (as a legacy, on condition that it is accessible to the public) to the Exeter Museum.

We learn with regret of the death, September 26th, of Professor Anton Dohrn, the founder and director of the Zoölogical Station at Naples.

Messrs. Ferriss and Daniels are exploring the Kaibab and Kanab plateaus for shells and ferns. In this little-known country north of the Grand Canyon of the Colorado, they report beautiful scenery, a superb climate, and plenty of shells.

Errata.—In the last number the following errors should be noted: P. 67, line 13 from bottom, last word, should be "*more*" in place of "*less*;" line 4 from bottom should be "*No. 10. l*" in place of "*10.*"

---

[1] Taken in part, from The Ottawa Naturalist, September, 1909.

THE NAUTILUS.

VOL. XXIII. DECEMBER, 1909. No. 7

ON SOME DEFORMED CYPRÆA TIGRIS FROM THE COLLECTION OF A. DA COSTA GOMEZ.

BY H. A. PILSBRY.

Many years ago the conchologists of Europe were astonished to receive from New Caledonia certain cowries which had the aspect of such well-known species as *C. moneta, lynx* and *mappa*, yet differed by the produced and calloused ends, attended with more or less thickening of the enamel and a degree of melanism, or clouding of the color-pattern. Several of these shells were named as distinct species by Crosse, Marie, Montrouzier and others. British writers generally did not admit their validity, considering them pathologic forms, due to some diseased condition of the mantle, a view ridiculed by Crosse in his witty review of G. B. Sowerby's monograph of Cypræa in the Thesaurus Conchyliorum. Mr. S. Raymond Roberts in his monograph[1] treats them as varieties. M. Ph. Dautzenberg has recently discussed these forms, figuring several of them.[2] The cause of the rostration and hypertrophic deposit of calcareous material has never been really settled, so far as I know, by observations on the living animals. The occurrence of so many forms modified in the same manner, in one locality, points to the action of me specific cause which might perhaps be recognized by an observer on the spot. It seems, however, that the modifications do not have racial significance. A somewhat similar formation characterizes some undoubtedly "good" species elsewhere, such as *C. scottii* and *C. problematica.*

[1] Manual of Conchology, Vol. VII.

[2] Journal de Conchyliologie, 1906, p. 263. plate ix.

Mr. A. DaCosta Gomez has called our attention to several New Caledonian examples of *Cypræa tigris* L. in his collection which show a rostration like the New Caledonian forms mentioned above, together with others diversely modified; and as such forms have not, to our knowledge, been noticed in this species, we have figured four of them on plates vii and viii, the two plates representing different views of the same specimens.

I. The upper left hand figures show a shell having a broad chestnut dorsal streak, the rest of the back being clouded with chestnut, light blue and dull pale brown. On the margins may be seen the characteristic dappled coloring of *tigris*. The base is normally colored. At the anterior end there are large callous lumps. The posterior end is also a little produced. Length 83 mm.

II. Upper right figures. This shell is broad and very heavy (weighing $7\frac{1}{8}$ ounces). The dorsal streak is interrupted, chestnut, partially overlaid with bluish callus. Elsewhere it is a soiled cream-white, obscurely and irregularly mottled. The base is stained with yellow around the mouth. The sides are very heavily calloused and lumpy. Length 90 mm.

III. Lower left figures. This shell is heavily calloused and produced at the ends and on the right margin. The spotted *tigris* pattern appears on the other side, but is covered by a dark enamel in the middle of the back. Base white, with some yellowish suffusion in places. Length 98 mm. This shell is characteristically New Caledonian in appearance.

IV. Lower right figures. A broad form, heavily calloused at the sides. The dorsal streak is dark purplish-brown; remainder of the back bluish-white, irregularly mottled and spotted with orange-brown and purple-brown, ends blackish. The base and teeth are brownish-yellow except for a pure white area on the inner lip. Length 85 mm.

ESSEX COUNTY NOTES.

BY REV. HENRY W. WINKLEY.

My last article was an urgent invitation to fellow-laborers to inspect mud. We may now view some results of the inspection.

Just south of Cape Ann, Mass., is a bay with many branches, forming harbors for Marblehead, Salem, Beverly and Danvers. The

inner waters, *i. e.*, at Danvers, seemed to be favorable for a colony of the forms which are common south of Cape Cod, but local and in sheltered places north of that cape. Only a partial examination has been made, but results are interesting. One mud flat of small area, and uncovered at low tide, was swarming with life. Literally I obtained quarts of *Gemma gemma*. With these were other species more or less abundant. *Columbella*, *Ilyanassa*, *Polinices* and such forms are expected and were found as usual. *Odostomia* revealed *trifida*, *bisuturalis*, *winkleyi* and a new species described below. I was able to secure here a living specimen of the disputed *fusca*, and observe the animal. Unlike some of this group, that are said to be timid in captivity, *fusca* was very active. Bulletin 37 of the U. S. Natl. Mus., plate xxvi, figs. 1 and 2, are labeled animal of *Turbonilla interrupta*. Slight changes would make the drawing for *fusca*. The plate gives the front of the foot in four lobes; for *fusca* it should be a continuous curve. From the plate one would infer that the mentum was of two flaps, one overlapping the other. In *fusca* this would not be correct, but a deep groove runs along the median line. The front of the mentum is a double curve, and its end is held close to the surface ahead of the foot in crawling, as if it was feeling the way. Eye spots are easily seen at the bases of the tentacles. The animal is semi-transparent, with parts a deep maroon. The tentacles are slender and held close to the mentum.

The above-named species were found at the headwaters, but no evidence of *Turbonilla*, as I had hoped. Rowing down river I smelt them, and came back for my dredge. A dozen specimens of *T. winkleyi* were found, good size, but badly eroded. In other parts of the Danvers River *Venus mercenaria*, *Astarte nucula* and some other forms occur, but I postpone exact lists until more work can be done. One unusual find was a solitary specimen of *Bela bicarinata* var. *violacea* on a mud flat between tides.

Later work was done at Salem. The inner harbor revealed the last-named species, with beautiful violet coloring, especially when wet. Salem harbor is practically all mud bottom. *Polinices*, *Nucula*, *Yoldia*, *Crenella*, *Periploma*, *Lyonsia*, *Tellina*, *Nassa*, *Bela*, *Retusa*, etc., are obtained at moderate depths. Shore collecting revealed the usual species, with some things worth noting. *Acmæa testudinalis* is very small and *alveus* scarce. At one small cove at low tide, with eel grass, I found another colony of *Turbonilla winkleyi*.

Passing to the outer harbor there is a slight change. More species of *Bela*, for example. Here I met a surprise in finding a third colony of *Turbonilla*. As the outer harbor is practically open sea, the occurrence is unusual. In fact the only locality known to me north of Cape Cod where that form occurs save in inner waters. So much ground remains to be examined that this report must be imperfect, yet the area covered showed *Astarte* very scarce. *Thyasira* lacking, and some other forms expected did not appear. I am told that there are small beds of them in places not yet dredged.

A few years ago the writer was stationed near New Haven. At that time I received much help from Dr. Bush, and together we examined many specimens of *Turbonilla*, *Odostomia*, *Bela* and other genera. It is my desire to recognize my high appreciation for her kind help by naming the following species for her. I am confronted with the fact that one *Odostomia* already bears her name. Not to be defeated in my purpose, I will use her first name, and am sure she will pardon me this time.

Odostomia (*Evalina*) *katherinæ*, new species.

Shell much smaller than *O.* (*E.*) *winkleyi*, bluish-white, semi-translucent. Nuclear whorls deeply obliquely immersed in the first of the succeeding turns, above which the tilted edge of the last volution only projects. Post-nuclear whorls well rounded, with a very strong beveled shoulder, marked by many very slender axial threads and a number of fine spiral lirations, of which one is at the angle of the shoulder, one on the shoulder a little nearer the suture than the angle; one forms the weak peripheral angle, and six others divide the space between the peripheral angle and the angle at the shoulder into subequal spaces. Sutures strongly constricted. Base short, well rounded, marked by spiral threads, of which the second one below the periphery is as strong as the peripheral one, the other four being of equal strength; the two basal ones dividing the space be-

tween the umbilical area and the stronger thread into three equal parts. Aperture very broadly oval, posterior angle very obtuse; outer lip thin, showing the external sculpture within; columella very slender, slightly twisted and very slightly revolute, provided with a very weak fold, which is scarcely discernible in the aperture, but becomes apparent when the pillar is exposed by grinding; parietal wall glazed with a light callus.

Specimens were found in the Danvers River, on a mud flat between tides, most of which are in the Winkley collection, and seven in the U. S. National Museum, cat. No. 208067. The one figured has $5\frac{1}{2}$ whorls and measures, length 2.15 mm., diameter 0.8 mm.

NEW HELICINA AND STROBILOPS FROM FLORIDA.

BY H. A. PILSBRY.

Several years ago Mr. G. H. Clapp called my attention to a form of *Helicina* differing in several respects from *H. orbiculata* Say, the specimens having been received from Mr. C. T. Simpson, who collected them at Lemon City, Florida. At about the same time Mr. Vanatta encountered the form in material from Lee Co., Fla., collected by Mr. C. B. Moore. He subsequently published a list of these shells (NAUTILUS for January, 1908, pp. 99–104), mentioning the form in question as *Helicina orbiculata* var. *clappi* Pils. MSS. No description has been published.

Helicina orbiculata was described from the mouth of the St. John's River. The types, four specimens, are still preserved with Say's label. They are globose, very pale greenish-white, and measure from alt. 6, diam. 6.8 mm., to alt. 6.3, diam. 7.7 mm. There is a distinct tooth at the junction of the columellar and basal lips. The periphery is well rounded.

In the St. John's River valley, away from the coast, and where calcareous material is almost wanting in the soil, there is a small race of *orbiculata*, measuring, alt. 5.5, diam. 6.8 mm., to alt. 4.5, diam. 5.1 mm.

H. orbiculata extends from Florida and Georgia west to Tennessee and western Louisiana. West and southwest of this it is entirely replaced by *H. orbiculata tropica* 'Jan.' Pfr., distinguished by its heavier shell and very thick lip.

HELICINA ORBICULATA CLAPPI, n. subsp.

The shell is less globose than *orbiculata*, tending to a more trochiform shape, the last whorl being very obtusely subangular at the periphery. The outer lip is more broadly expanded, thin, and there is only a weak angle or none at the junction of columella and basal lip. The color is white, very pale citrine, white with two red bands, or uniform red, the lip and apex pale.

Alt. 8, diam. 9 mm.

Alt. 7, diam. 8 mm.

Alt. 6.1, diam. 7.3 mm.

Distribution: Southern Florida, Dade, Lee and Monroe counties; types from Miami, Dade Co., collected by S. N. Rhoads and H. A. Pilsbry, 1899. On the east coast *H. o. clappi* extends as far north as Palm Beach (Pilsbry, 1899); on the west coast to Evans' Plantation on the Manatee River (C. T. Simpson).

Key to Subspecies of H. orbiculata.

a. Last whorl globose, periphery well rounded; a distinct tooth or angle at base of the columella.

b. Lip thin or not much thickened, *H. orbiculata.*

bb. Lip much thickened, *H. o. tropica.*

aa. Last whorl very obtusely subangular, the shape approaching trochiform; no distinct tooth at base of the columella, *H. o. clappi.*

STROBILOPS FLORIDANUS, n. sp.

The shell is conic with convex outlines, almost dome-shaped; the periphery only weakly angular, the base convex; rather solid; brown, the summit whitish-corneous. Whorls $5\frac{1}{2}$, the first two smooth, the rest sculptured with narrow, rather widely separated ribs (about 30 on the last whorl). These ribs continue on the base, which is radially ribbed. Aperture semilunar, the peristome thick, narrowly reflexed, brown or whitish; parietal callus rather thick at the edge. Parietal lamella emerging to the edge of the callus, fully a whorl long. Infraparietal lamella scarcely emerging, penetrating as far inward as the parietal lamella. The inner half of this lamella and the parietal is nodose, the nodes minutely asperate. Interparietal lamella very low, about a half whorl long, nodose, penetrating as deeply as the parietal lamella. There is one axial lamella and four basal plicæ,

CYPRÆA TIGRIS FROM A. DA C. GOMEZ COLL.

CYPRÆA TIGRIS FROM A. DA C. GOMEZ COLL.

the outer one peripheral in position; a single palatal plica is generally developed. These plicæ form a curved, very obliquely radial series, the inner end near the aperture. The two inner basal lamellæ are much stouter and higher than the others, the second from the axis (or third, counting the axial) being the longest and highest of the plicæ.

Alt. 1.8, diam. 2.5 mm.

Florida: Type No. 77044 A. N. S. P., from Miami, collected by S. N. Rhoads, 1899. Also widely distributed over the State. Tallahassee (C. W. Johnson, 1900). St. John's valley, Volusia and Marion counties (Johnson and Pilsbry, 1894) and many other localities.

This species resembles *S. virgo* Pils. in shape and peristome, but it differs in the more widely spaced ribs, continued over the base. It differs from all known North American species by the *much more deeply entering parietal lamellæ*, the inner ends of which pass under the parietal callus of the aperture. In other species these lamellæ are only about a half whorl long. The inner basal plicæ are also placed more deeply within than in other species. *S. texasiana* Pils. and Ferr. resembles *S. floridana* in shape and in having a ribbed base, but the sculpture is much closer and the lamellæ do not extend so far inward.

S. floridanus is a common and widely distributed species in Florida. A depressed and angular form of *S. labyrinthicus* resembling *S. l. strebeli* occurs in some places, and *S. hubbardi* (A. D. Brown) also has a wide distribution on the peninsula and keys.

Several other races of *Strobilops* will be defined in a future paper. The shells have to be opened carefully to demonstrate the internal structure, but fresh specimens can usually be determined without opening. Information is especially desired by the writer on the forms of New York State, and will be duly credited in a monograph of that fauna now in preparation.

MOLLUSKS FROM KANSAS AND OKLAHOMA.

BY FRANK C. BAKER.

During the past year Mr. F. B. Isely, Professor of Biology in the Oklahoma University Preparatory School, Tonkawa, Oklahoma, has sent to the Chicago Academy of Sciences several interesting lots of

shells from Kansas and Oklahoma. As this region is not well known conchologically, it has been thought that a list of the species would be of value as a contribution to the subject of geographic distribution. The region includes Grant and Kay counties, Oklahoma, and Sumner, Harper and Kingman counties, Kansas. The collection is now deposited in the Chicago Academy of Sciences. My thanks are due to Mr. Bryant Walker and Dr. V. Sterki for assistance in determining critical material.

PELECYPODA.

Lampsilis anodontoides (Lea). Chikaskia River, Tonkawa, Oklahoma.

Lampsilis subrostrata (Say). Spring Creek, Grant county, Oklahoma.

Lampsilis parva (Barnes). Bluff Creek, Grant Co., Oklahoma.

Lampsilis purpurata (Lamarck). Chikaskia River, Tonkawa, Oklahoma.

Lampsilis gracile (Barnes). Shoofly Creek, Williston, Oklahoma.

Plagiola donaciformis (Lea). Chikaskia River, Hunnewell, Kansas.

Tritogonia tuberculata (Barnes). Chikaskia River, Tonkawa, Oklahoma.

Anodonta grandis Say. Chikaskia River, Tonkawa, Oklahoma; Chikaskia River, Williston, Oklahoma.

Anodonta corpulenta Cooper. Duck Creek, near Tonkawa, Oklahoma.

Anodonta imbecilis Say. Shoofly Creek, Williston, Oklahoma.

Symphynota complanata (Barnes). Chikaskia River, Tonkawa, Oklahoma; Chikaskia River, Williston, Oklahoma.

Unio tetralasmus camptodon Say. Spring Creek, Anthony, Kansas.

Unio tetralasmus sayi Ward. Spring Creek, Grant Co., Oklahoma.

Quadrula undulata (Barnes). Chikaskia River, Tonkawa, Oklahoma; Chikaskia River, Drury, Kansas; Shoofly Creek, Williston, Oklahoma.

Quadrula undulata latecostata (Lea). Shoofly Creek, Williston, Oklahoma.

Quadrula lachrymosa (Lea). Chikaskia River, Tonkawa, Oklahoma; Chikaskia River, Drury, Kansas.

Quadrula pustulosa (Lea). Chikaskia River, Tonkawa, Oklahoma; Chikaskia River, Drury, Kansas.

Quadrula pustulosa var. Chikaskia River, Drury, Kansas.

A peculiar shell is associated with *pustulosa* at this locality. It is compressed, quite elongated, and the surface is ornamented with many olive-green rays, radiating from the umbones. It is smooth, like *schoolcraftensis*, but is much more elongated than that variety, to which the Oklahoma *pustulosa* might quite appropriately be referred. No specimens of the typical *pustulosa* have been seen from the region in question. Additional material may show this to be a recognizable race of *pustulosa*.

Quadrula rubiginosa (Lea). Chikaskia River, Drury, Kansas.

Quadrula coccinea (Conrad). Chikaskia River, Drury, Kansas; Chikaskia River, Tonkawa, Oklahoma.

Sphærium simile Say, variety. Tonkawa, Oklahoma; Wild Horse Creek, Spivey, Kansas.

A much elongated and very cylindrical shell, which may prove to be a race of *simile*.

Sphærium striatinum Lamarck. Sand Creek, Argonia, Kansas.

Musculium transversum (Say). Shoofly Creek, Williston, Oklahoma.

Musculium elevatum (Haldeman). Tonkawa, Oklahoma; Meridian Creek, South Haven, Kansas.

Not quite typical, the shell being more elongate ovate in outline than in typical *elevatum*.

GASTROPODA.

Physa crandalli Baker. Wild Horse Creek, Spivey, Kansas; Sand Creek, Argonia, Kansas; Meridian Creek, South Haven, Kansas; Spring Creek, Anthony, Kansas; Shoofly Creek, Williston, Oklahoma; Spring Creek, Grant Co., Oklahoma.

Physa ancillaria Say. Spring Creek, Grant Co., Oklahoma; Wild Horse Creek, Spivey, Kansas; Tonkawa, Oklahoma; Shoofly Creek, Williston, Oklahoma.

The specimens are exactly comparable with typical *ancillaria* from Philadelphia.

Physa anatina Lea. Tonkawa, Oklahoma.

Ancylus rivularis Say. Shoofly Creek, Williston, Oklahoma.

Planorbis trivolvis Say. Wild Horse Creek, Spivey, Kansas; Spring Creek, Grant Co., Oklahoma.

Planorbis deflectus Say. Spring Creek, Anthony, Kansas.

Lymnæa obrussa Say. Wild Horse Creek, Spivey, Kansas; Sand Creek, Argonia, Kansas.

Lymnæa parva Lea. Tonkawa, Oklahoma.

Lymnæa techella Hald. Tonkawa, Oklahoma.

Succinea avara Say. Spring Creek, Anthony, Kansas.

Succinea luteola Gould. Tonkawa, Oklahoma.

Agriolimax campestris Binney. Tonkawa, Oklahoma.

Polygyra fraterna Say. Tonkawa, Oklahoma.

THE MOLLUSCA OF DOUGLAS COUNTY, KANSAS. GASTEROPODA.

BY G. DALLAS HANNA.

(*Concluded from p. 83.*)

Polygyra fraterna friersoni Pilsbry. Very rare; a few specimens identical with specimens of this variety from southern Kansas have been found in this county.

Bulimulus dealbatus Say. This is evidently the form *liquabilis* Reeve, but I have not seen specimens of the subspecies to make comparison. It is found rather commonly on open rocky hillsides.

Pupilla muscorum Linnaeus. From river drift at Lawrence.

Pupilla blandi Morse. A few drift specimens have been picked up.

Pupilla hebes Ancey. Two specimens found in drift, one at Tecumseh and the other at Lawrence.

Pupoides marginatus Say. Common everywhere.

Bifidaria procera Say. Common in open places favorable for mollusks.

Bifidaria procera cristata P. & V. Rare this far east.

Bifidaria hordeacella Pilsbry. One specimen found in river debris at Lawrence.

Bifidaria holzingeri Sterki. Very rare; it gives way to the form *Bifidaria holzingeri fordiana* Sterki. Found in the woods of Blue Mound and elsewhere.

Bifidaria contracta Say. Common in timber lands.

Bifidaria armifera Say. Abundant.

Bifidaria pentodon Say. Found sparingly in the woods.

Bifidaria tappaniana C. B. Adams. Common on Blue Mound.

Bifidaria agna P. & V. Very rare; two specimens from drift debris of the Kansas river at Lawrence.

Vertigo ovata Say. Apparently rare.

Vertigo milium Gould. A few specimens came from Blue Mound.

Vertigo tridentata Wolf. Our commonest Vertigo; found on Blue Mound and in river drift at various places.

Strobilops affinis Pilsbry. Common in woody places.

Vallonia parvula Sterki. Very common where there is no shade.

Vallonia costata Müller. Drift specimens only have so far been found.

Cochlicopa lubrica Müller. Common on Blue Mound.

Agriolimax campestris Say. Not common.

Agriolimax agrestis Linnaeus. This is the common slug of Kansas.

Vitrea rhoadsi Pilsbry. This form is rather common in the woods.

Vitrea indentata umbilicata Cockerell. Abundant everywhere.

Vitrea milium Morse. This species is associated with *Z. minuscula*, but is less common in most places.

Zonitoides arborea Say. Abundant in all woods.

Zonitoides nitida Müller. Apparently a rare species and locally distributed. I have found it only near Lake View.

Zonitoides minuscula Binney. This species is common in open woodlands.

Zonitoides minuscula alachuana Dall. Found associated with the typical form but less common.

Zonitoides singleyana Pilsbry. A species of the open plains.

Zonitoides nummus Vanatta. Found at Lake View and at Blue Mound, in the woods on each occasion.

Euconulus chersinus trochulus Reinhardt. Found in the woodlands with *Z. nummus*.

Philomycus carolinensis Bosc. Rather common on Blue Mound. A number of specimens have been taken.

Pyramidula alternata Say. Abundant in wooded and rocky places.

Pyramidula asteriscus Morse. A few specimens have come from Blue Mound and more from river débris at various places in the county.

Helicodiscus parallelus Say. This species lives in colonies around the limestone bluffs altogether.

Helicodiscus eigenmanni Pilsbry. One specimen was picked out of drift from Lecompton; it probably washed there from farther west.

Punctum pygmaeum Draparnaud. Apparently rare, as it has only been found once, and then in river drift from Lawrence.

Succinea avara Say. Not common.

Succinea grosvenori Lea. Found in colonies in wet places.

Succinea rusticana Gould. Generally distributed, but it has not been found common.

Succinea stretchiana Bland. This is our common *Succinea.*

Carychium exile Lea. A colony of this species was found near the top of Blue Mound.

Helicina occulta Say. Drift specimens have been found at Lawrence in a situation that would lead one to suspect that it is a resident.

Lymnea techella Haldeman. Abundant in a drainage ditch south of Lawrence.

Lymnea columella chalybea Gould. Found in the Whitcomb greenhouse at Lawrence on the sides of flower-pots.

Lymnea dalli Baker. Found in the greenhouse with *L. columella chalybea* and also in river drift.

Lymnea elodes Say. One drift specimen is from Lawrence.

Lymnea obrussa Say. Rather common in a watercress spring west of Lawrence.

Lymnea parva Lea. Only a few specimens from river débris have been found.

Lymnea reflexa Say. This form used to be very common in Lake View, but the flood of 1903 swept almost all away.

Lymnea reflexa crystalensis Baker. Not common in this county.

Planorbis bicarinatus Say. Lake View and Rock Creek.

Planorbis trivolvis Say. Abundant in all ponds.

Planorbis deflectus Say. Lake View.

Planorbis parvus Say. A few specimens were found along the Kansas River.

Physa anatina Lea.

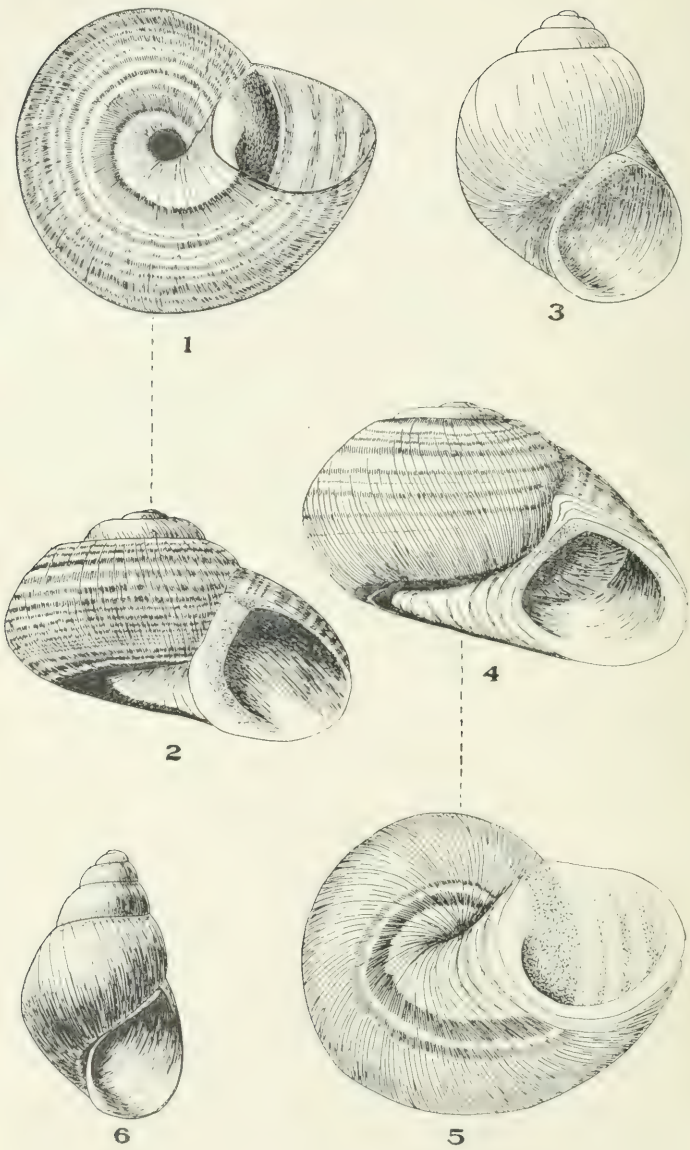
Physa oleacea Tryon. These two species were identified by Mr. Bryant Walker. All the specimens of this county seem referable to them.

Amnicola cincinnatiensis Lea. Found in mud creek commonly.

Amnicola limosa Say. A single dead shell from the Kansas River.

Campeloma decisum Say.

Campeloma subsolidum Anthony. These two forms live abundantly in the Wakarusa Creek, but are easily distinguishable.



MEXICAN AMNICOLIDÆ.

THE NAUTILUS.

VOL. XXIII. JANUARY, 1910. No. 8

NEW AMNICOLIDÆ OF THE PANUCO RIVER SYSTEM, MEXICO.

BY HENRY A. PILSBRY.

In the course of Mr. A. A. Hinkley's expedition to the Panuco river region in 1907 he found *Potamopyrgus coronatus* (Pfr.), *Paludestrina tampicoensis* Pils., *Cochliopa riograndensis* Pils. & Ferr., and an *Amnicola* identified as *A. guatemalensis* C. & F., but which on further study turns out to be a new species. Several more forms are now added by the expedition of 1909, among them a southwestern representative of *Somatogyrus* and some very handsome though small species of *Cochliopa*.

In the works of Crosse and Fischer and of von Martens, the American spinose Amnicoloids are referred to the genus *Amnicola*, in the belief that *Potamopyrgus* does not occur in America. This idea is in my opinion wholly erroneous. The American *P. coronatus* (Pfr.) has the dentition and the *viviparous reproduction* of the New Zealand type of *Potamopyrgus*. In New Zealand, as in America, both spinose and smooth forms occur. There is no conchological difference. No *Amnicola* is viviparous, and there is a perceptible if small difference in the shells, which are more compact and more solid in *Amnicola*.

The genus *Potamopyrgus* occurs also in the Antilles, South America, West Africa and Tasmania. Perhaps the British *Hydrobia jenkinsi* belongs to this genus. If viviparous it certainly does; but I have not investigated the species. Like *Planorbis*, *Viviparus*, *Lymnæa* and some other fresh-water genera, it seems that *Potamopyrgus* has a very wide geographic distribution. In female *Potamopyrgus* one finds the young shells as in the genus

Viviparus. This character serves to differentiate it from *Paludestrina*, which the smooth phase resembles in shell structure.

Amnicola crosseana n. sp. Pl. ix, fig. 6.

The shell is perforate, ovate-conic, corneous, smooth, the growth-lines being scarcely visible. Whorls 5, the first very minute, the rest not very convex; suture but slightly impressed, having a gray border (by transparence) below. Umbilical region defined by an angle. Aperture ovate, slightly oblique. Peristome thin, narrowly olive-edged, represented by an adnate transparent callus on the parietal wall, which is rather long.

Length 3.1, diam. 2, length of aperture 1.6, width 1.1 mm.

Found only in ponds at La Barra, near Tampico.

This species was taken in considerable numbers. It has some resemblance to *A. guatemalensis* Crosse & Fischer (*Paludina hyalina* Morelet, not Anton), but on comparing a specimen received from Morelet it is noticed that *guatemalensis* has much more convex whorls and a shorter more rotund aperture. *A guatemalensis* is very closely related to *A. panamensis* Tryon. I doubt whether the two forms are specifically distinct.

A. crosseana, named for M. Hippolyte Crosse, is distinct from species of the Texan region by its lengthened shape, rather pointed apex, the weak convexity of the whorls, the long adnate parietal callus and the angulation around the umbilical region. With the milky corneous examples there are many of a brown or russet tint, probably owing to a thin ferrous incrustation.

Amnicola comalensis Pils. & Ferr. from Texas described in the Proc. Acad. Nat. Sci., Phila., 1906, p. 171, fig. 37, is a much stouter shell than *A. crosseana*. In the description the length was given by error as 3.9 mm. It should have been 2.9 mm.

Somatogyrus mexicanus n. sp. Pl. ix, fig. 3.

The shell is perforate, globose, higher than wide, corneous, smooth, solid but rather thin. Whorls $4\frac{1}{2}$, strongly convex, parted by a deep suture, rather slowly increasing at first, but at the last whorl very rapidly enlarging. The last whorl is very convex, and descends more rapidly near the aperture. The aperture is ovate, subangular above. The outer lip is a little curved forward in the middle, or in other words, retracted above, thin-edged. The inner

lip is arcuate below, straightened above, heavily calloused in adults, especially above, and in contact with the preceding whorl only for a very short distance. There is a somewhat flattened umbilical area below the perforation, closely marked with growth-striæ, and bounded by an angle, which is sometimes not very distinct.

Length 5.3, diam. 4.5, aperture 3.1 mm.

Length 5, diam. 4.5, aperture 3.1 mm.

Coy river, on the road to Tampamolon; State of San Luis Potosi. Types no. 99023 A. N. S. P.

This is the first *Somatogyrus* from west or southwest of the Mississippi river system.

Cochliopa compacta n. sp. Pl. ix, figs. 4, 5.

The shell is depressed, solid, rimate, pale greenish olive, encircled with few or many dark olive or blackish lines and narrow bands, and sometimes a few cream-white bands. Spire convex, very narrow when viewed from above. Whorls $3\frac{1}{2}$ to nearly 4, the early ones smooth, the last very wide, rounded, sculptured with low spiral threads or nearly smooth, descending to the aperture. The aperture is rotund-ovate, angular above, the outer lip slightly thickened, columellar and parietal margins thick. The umbilical area behind the columellar lip in fully adult shells is white and wide, the basal rimation either long or rather short.

Alt. 2, diam. 3.9 mm.

Choy river at the cave, south of Las Palmas, State of San Luis Potosi, Mexico.

This species is closely related to *C. picta*, differing by the larger aperture, compressed and generally closed umbilical region, and the peculiar area behind the columellar lip of adult shells. It was taken in considerable quantity.

The figures represent one of the most common color-forms. Other examples have lines and bands over the base also; and in some these markings are reduced to a few wide bands.

Cochliopa riograndensis Pils. & Ferr.

Valles river at Valles and Willis's ranch; Ganina river near Rascon. It is an abundant and variable species. In some examples the last whorl becomes free at the aperture, reminding one of the small shell described as *Valvata micra*. That species may prove to be a *Cochliopa*.

COCHLIOPA PICTA n. sp. Pl. ix, figs. 1, 2.

The shell is depressed, solid, narrowly umbilicate, there being a minute perforation and a curved, semicircular rimation where it enlarges at the last whorl; inner whorls pale olivaceous-corneous, the last encircled with many dark olive spiral lines and bands, which are almost imperceptibly raised. The spire is convex, and narrow viewed from above, the last whorl being very wide. Whorls $3\frac{1}{2}$, the last rounded, indistinctly plicate radially around the umbilicus. The aperture is rounded-ovate, angular above; outer lip thin; columellar lip rather heavily calloused; parietal wall short, calloused. Alt. 2.1, diam. 3.7 mm.

Coy river, near the ford on road to Tampamolon, State of San Luis Potosi, Mexico. A few smaller specimens were taken in the Ganina river near Rascon.

This species differs from *C. riograndensis* by its much smaller umbilicus, opening out only at the last half whorl. The spire is also more depressed. Many specimens were taken.

RECTIFICATION OF THE NOMENCLATURE OF THE NUDIBRANCHIATA IN LERMOND'S "SHELLS OF MAINE."

BY FRANCIS N. BALCH.

A meritorious attempt by Norman Wallace Lermond to list the mollusca of Maine has recently appeared under the title indicated above, and has been noticed in a recent number of the NAUTILUS.

Considering the confused state of our knowledge (or rather ignorance, for knowledge we have little) of the Nudibranchs, it is scarcely a reflection on Mr. Lermond that his list of this most interesting but neglected group reflects the state of knowledge of nearly forty years ago. It is a painful admission that the additions to our knowledge since that time have been few and scattering, but such as they are they should be recognized; and Mr. Lermond's list, otherwise of considerable use as almost the only recent list of Nudibranchs from the northeast coast, might do mischief if allowed to stand uncorrected in this particular—hence the following remarks.

Aeolis purpurea Stimps. in all probability is *Cratena pustulata* (A. & H.), as Bergh believed, and should be written accordingly, though with a query.

Aeolis stellata Stimps. is a *Coryphella* only very doubtfully distinct from the same author's *mananensis*, which in turn is either a synonym or a variety of Johnston's *rufibranchialis*—see a recent article by me in the NAUTILUS.

Eolis (*Cavolina*) *salmonacea* Couth. (now universally but perhaps erroneously treated as a *Coryphella*) although omitted from this list, has been reported by Verrill from Eastport. But what Verrill understood that species to be no one can say except that it certainly was not the same as what European authors understand. But then, what European authors understand is just as certainly not what Couthouy meant! The fact is the true *salmonacea* is entirely enigmatical. However it should appear in the list.

Dendronotus arborescens Müller should be *D. frondosus* (Ascanius)—this change has been universally adopted.

Cadlina repanda (A. & H.) should be *C. obvelata* (Müller)—same remark as last.

Issa lacera should be credited to (Abildgaard) instead of (Müller).

Doris bifida Verrill (entered twice in the list, once as a variety of *Acanthodoris pilosa* and once as a variety of *A. stellata*), *Doris stellata* Gmelin and *Acanthodoris citrina* Verrill, are all synonyms of *Acanthodoris pilosa* (Abildgaard); while *D. ornata* Verrill is at most a variety.

It is extremely doubtful whether *Lamellidoris diaphana* (A. & H.) really occurs on our coast. The common Maine form I believe to be *L. aspera*, mentioned below. However it correctly appears in this check list.

Probably nothing can be done with *Lamellidoris tenella* and *L. grisea* but to retain them as Mr. Lermond has done, though they are practically nomina nuda.

Ancula sulphurea Stimps. is a variety of *A. cristata* (Alder).

With regard to *Idaliella pallida* (Ag.) Gould, several errors appear to have crept in. No *Idaliella* occurs in Maine so far as I am aware. The only eastern American members of the sub-genus known, I think, are *pulchella* A. & H., found at Salem, Mass., in 1879, by Emerton, and *modesta* Verrill from Vineyard Sound and vicinity. There is, however, a *Lamellidoris pallida* of Ag. the distribution of which is such as Mr. Lermond's list gives, and of which *Proctaporia fusca* Stimps. is a synonym as given. The citation in synonymy of *Amoeroecium pallidum* Verrill 1873, is, of course, in-

advertence. *Amoeroecium* is a genus of compound Ascidians. Verrill, in his Rep. on Invert. of Vin. Sound, 1873, notices (on different pages) both *Amoeroecium pallidum* and *Onchidoris pallida* which latter is of course what Mr. Lermond intended to cite.

Pallida is, however, a synonym of *Lamellidoris aspera* (A. & H.). The entry, therefore, should stand as *Lamellidoris aspera* (A. & H.) with *Proctaporia fusca* Stimps. 1860, *Doris pallida* Ag. 1849, and *Onchidoris pallida* "Verrill," Verrill 1870 and 1873, in synonymy.

Lamellidoris muricatus should be written *muricata.*

Palio lessoni should be written *lessonii.*

UNIONIDÆ FROM SOUTHEASTERN ARKANSAS AND N. E. LOUISIANA.

BY E. G. VANATTA.

Mr. Clarence B. Moore collected the following species of *Unionidæ* while on an archaeological expedition during the winter of 1908–09.

Quadrula ebena Lea was everywhere the most abundant species. Dr. Pilsbry agrees with me in considering *Unio dombeyana* Val. in Humboldt et Bonpland, Rec. Obs. Zool., 1833, Vol. 2. p. 227, pl. 53, f. 1, a valid variety of *Quadrula heros* Say, instead of a synonym of *Q. trapezoides* Lea.

The originally varietal name *obesa* Simps. is used instead of *Tritogonia tuberculata* Bar. as the name *tuberculata* is preoccupied in *Quadrula. Unio tuberculatus* Barnes was grouped with *U. apiculatus* (now referred to the genus *Quadrula*) by Pilsbry in 1891 (NAUTILUS V, p. 76); a position confirmed by Dr. H. von Ihering in 1901 (NAUTILUS XV, p. 39), and by Dr. Arnold Ortmann this year. (Ann. Carnegie Mus., 1909, Vol. 5, p. 193.)

All the specimens of *Quadrula trapezoides, pyramidata, ebena, obesa* and *Plagiola securis* were smaller than the usual size.

I. Pyles Landing, Ouachita River, Calhoun Co., Arkansas. *Obovaria castanea* Lea and *Anodonta opaca* Lea.

II. Near Pigeon Hill, Ouachita River, Union Co., Arkansas.

Obovaria castanea Lea.
Plagiola securis Lea.
" *elegans* Lea.
Strophitus edentulus Lea.
Unio subgibbosus Lea.
Quadrula plicata Say.
" *heros dombeyana* Val.
" *metanevra* Raf.
" *asperrima* Lea.
" *obesa* Simps.

Quadrula sphærica Lea.
" *nodifera* Conr.
" *trigona* Lea.
Quadrula pyramidata Lea.
" *ebenus* Lea.

III. Caryville Landing, Ouachita River, Union Co., Arkansas.

Lampsilis hydianus Lea.
" *ligamentinus gibbus* Simps.
" *fallaciosus* (Sm.) Simps.
Obovaria castanea Lea.
Plagiola securis Lea.
Unio gibbosus Bar.
" *subgibbosus* Lea.
Quadrula perplicata Conr.
" *heros dombeyana* Val.
" *metanevra* Raf.
" *asperrima* Lea.
" *nodifera* Conr.
" *trigona* Lea.
" *pyramidata* Lea.
" *ebena* Lea.

IV. Seven Pine Landing, Bayou Bartholomew, Morehouse Parish, Louisiana. *Quadrula trapezoides* Lea.

V. Alabama Landing, Ouachita River near the mouth of Basche La Pierre Creek, Union Parish, Louisiana, 12 miles in a straight line above Ouachita, Louisiana.

Lampsilis ventricosus satur Lea.
" *ligamentinus gibbus* Simps.
" *fallaciosus* (Sm.) Simps.
" *purpuratus* Lam.
Plagiola securis Lea.
Unio gibbosus Bar.
Quadrula perplicata Conr.
" *heros dombeyana* Val.
" *trapezoides* Lea.
" *cylindrica* Say.
" *obesa* Simps.
" *sphærica* Lea.
" *pyramidata* Lea.
" *ebena* Lea.

VI. 15 miles below Monroe, Ouachita River, Ouachita Parish, Louisiana.

Lampsilis ventricosus satur Lea.
Obovaria castanea Lea.
Quadrula perplicata Conr.
" *heros dombeyana* Val.
" *trapezoides* Lea.
" *metanevra* Raf.
Quadrula asperrima Lea.
" *sphærica* Lea.
" *nodifera* Conr.
" *trigona* Lea.
" *pyramidata* Lea.
" *ebena* Lea.

VII. White Oak Landing, Boeuf River, Franklin Parish, Louisiana.

Lampsilis hydianus Lea.
" *anodontoides* Lea.
Quadrula heros dombeyana Val.
Quadrula trapezoides Lea.
" *asperrima* Lea.

VIII. Ouachita River, Catahoula Parish, Louisiana.

Quadrula heros dombeyana Val.
" *asperrima* Lea.
Quadrula ebena Lea.

IX. Black River, Catahoula Parish, Louisiana.

Lampsilis fallaciosus (Sm.) Simps.
Obliquaria reflexa Raf.
Quadrula heros dombeyana Val.
" *trapezoides* Lea.

VALVATIDAE OF THE WESTERN NORTH AMERICA.

BY HAROLD HANNIBAL.

While preparing a paper on the tertiary fresh-water fossils of Western North America it became necessary to go over the literature and examine all the *Valvatidae* available. This included specimens from the type localities of *V. utahensis* and *V. virens* and part of the original lot from which *V. humeralis californica* was described. There is therefore no doubt as to the authenticity of the determinations.

Two new fossil species have turned up in the Upper Lahontan (Quartenary) of Nevada and Southern Oregon, descriptions of which are given here. In a paper on fresh-water fossils now in progress, all the species will be figured together for comparison.

On account of the complex and unsatisfactory nature of a key the following table has been devised:

Broadly umbilicate.				Narrowly umbilicate.
V. whitei.	*V. humeralis.*	*V. calli.*	*V. virens.*	*V. utahensis.*
Spire barely raised above body whorl.	Rather low.	Very low to very high.	Moderately high.	High.
Smooth.	Smooth.	Smooth, carinate, or marked by spiral striae.	Fine growth striae.	Smooth.
Whorls rounded beneath.	Somewhat flattened.	Rounded or carinate.	Rounded.	Somewhat angular.
?	Blue-green or brown.	?	Light to dark green.	Pellucid.

V. lewisii Currier and *V. sincera* Say have been reported from west of the Rocky Mountains, but it is probable that all the specimens will prove to be *V. humeralis*. This is a somewhat variable and badly misunderstood species. It is apparently widely distributed over all the Pacific slope.

With the exception of *V. humeralis* all the species are abundant wherever they occur, but they are sporadic. This species is also sporadic but seldom occurs in large numbers.

Valvata humeralis Say.

Valvata humeralis Say. New Harm. Diss., II, 1829, p. 244. Mexico.

Valvata humeralis californica Pilsbry. Naut., XXII, 1908, p. 82. Bear Lake, Cal.

Small, smooth, brown or blue-green, spire variable but always low, umbilicus moderately broad, sutures slightly impressed. Characterized by a noticeable flattening about the umbilicus.

The barely matured specimens from Bear Lake do not show this character as noticeably as others in the writer's collection. This species has been identified by west coast conchologists as *V. virens*, *V. lewisii*, and *V. sincera*. The latter two can be easily eliminated but the specimens from several of the localities given with a question mark under *V. virens* may on re-examination prove to be *V. humeralis*. Not known as fossil.

Distribution.[1]

Mexico.

California.

* Bear Lake, San Bernardino Mts. (Berry).
* Bluff Lake, San Bernardino Mts. (Berry).
* Soap Lake, San Benito Valley (Hannibal).
* Pond, Likely, South Pitt Valley (Hannibal).
Slough, De Witte, Honey Lake Valley (Hannibal).

Oregon.

* Upper Klamath Lake (Hannibal).

Washington.

Lake Washington, Seattle (Randolph).

---

[1] * Seen by writer.
? Identification doubted.

Idaho.

Near Franklin (Hemphill).

Utah.

Near Salt Lake City (Yarrow and Hemphill).

VALVATA VIRENS *Tryon.*

Valvata virens Tryon, Proc. Acad. Nat. Sci., Phila., 1863, p. 148, pl. 1, fig. 11.

Spire moderately elevated, whorls rounded, umbilicus rather narrow, sutures moderately deep, shell marked by fine transverse striae, light green to deep green color.

It has been the custom to refer any western American Valvata of a green color or with an elevated spire to *V. virens*. The writer does not know of its authentic occurrence north of Clear Lake. Call's Great Basin specimens are *V. calli*. References to living specimens from northeastern California and southeastern Oregon are probably *V. humeralis*.

California.

* Clear Lake (Tryon, Cooper, Hemphill).

Alameda Co. (Cooper).

Antioch (Carlton).

* Pond near Watsonville (Laws, Hannibal).

? Willow Creek, Lassen Co. (McGregor).

Oregon.

? Grant's Lake (Cooper).

British Columbia.

? Nanaimo, Vancouver Is. (Dall).

? Lake Laggan, Rocky Mts. (Taylor).

Fossil: Santa Clara Beds (Pliocene).

Gelrich's coal mine, Santa Cruz Mts., Cal. (Cooper).

* Galabazos Canon, Santa Cruz Mts. (Hannibal).

Kettleman Beds: 10 miles east of Tulare Lake, west border of Kettleman Plains (Watts).

VALVATA UTAHENSIS Call.

Valvata sincera var. *utahensis* Call, Bull. 11, U. S. Geol. Sur., 1884, p. 44, pl. vi, fig. 1–3.

Characterized by its tabulated whorls, well elevated spire, and very narrow umbilicus, sutures moderately deep; lip slightly diagonal, usually angular below. Shell smooth, pellucid.

This species is known only from near the type locality. It reminds one of *V. piscinalis* of Europe.

Utah.

* Lehi, Utah Lake, near head of Jordan River (Call).

Fossil: Semifossil, Bonneville Basin, Utah (Call.)

VALVATA CALLI n. sp.

Valvata virens Call, Bull. 11, U. S. Geol. Sur., 1884, p. 21 (in part).

Shell varying from a high spire as in *V. virens* to a very low spire as in *V. lewisii;* sculpture, smooth, carinate tricarinate or marked by numerous spiral striae. Umbilicus rather narrow; whorls rounded in smooth or striate forms angular in carinate forms. Sutures deeply impressed in high forms, slightly in low. Type tricarinate with moderately elevated spire.

Measurements: *Type*, alt. 4.5 mm., diam. 5.5 mm., diam. of aperture 2 mm.; *flattened specimen*, alt. 4 mm., diam. 6 mm., diam. of aperture 2 mm., Marl, Upper Lahontan Quarternary, near Summer Lake, Ore. (F. M. Anderson).

Also from "Central Nevada, near R. R.," named in honor of the late Robert Ellsworth Call.

VALVATA WHITEI n. sp.

Spire depressed, barely raised above outer whorl, broadly umbilicate two whorls visible beneath; shell rather thick, smooth, marked by very faint growth lines; sutures very slightly impressed, whorls round.

Measurements: Alt. 2.5 mm., diam. 6 mm., diam. of aperture 2.5 mm., Marl., Upper Lahontan, Quarternary, near Summer Lake, Oregon (F. M. Anderson).

This species resembles a very large specimen of *V. humeralis*, but the umbilicus is much broader in specimens of a corresponding size. The species also has a much thicker shell.

Named in honor of the late Dr. C. A. White.

Stanford University, Cal.

AN APPARENTLY NEW SLUG FROM THE RIVER NILE.

BY T. D. A. COCKERELL.

The slug here described was kindly placed in my hands for determination by Professor H. M. Gwatkin, of Cambridge, England.

Veronicella nilotica, n. sp.

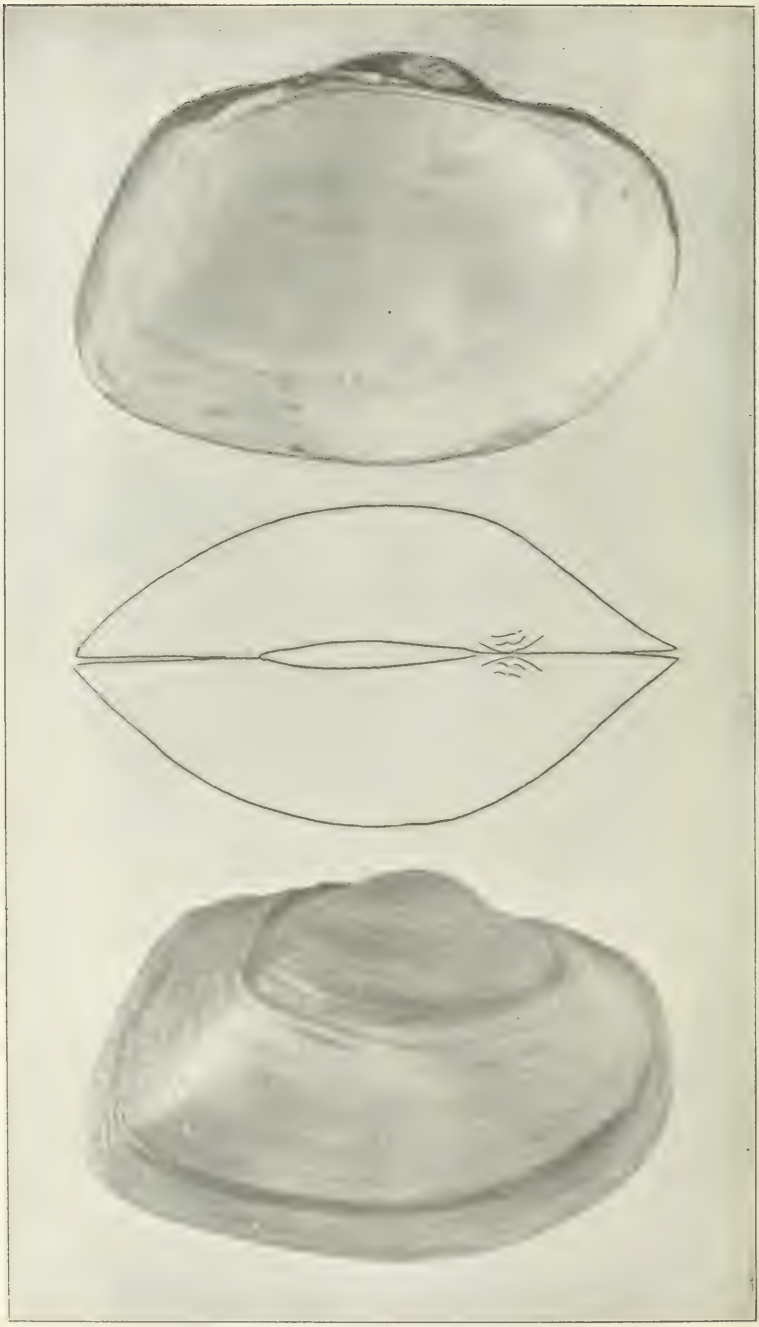
Length 43 mm., breadth 11½; unusually narrow and parallel-sided; sole narrow, its width about 4 mm., with 16 transverse grooves (not counting the lesser ones between each pair of strong ones) in 5 mm. of length; female generative orifice 1⅕ mm. from sole and 2⅘ from lateral margin, its distance from head about 27⅓ mm. Upper surface finely and densely tuberculate, some of the tubercles a little larger and more prominent than the others; hyponotum finely and more obscurely tuberculate. Color above (in alcohol) pale ochreous densely mottled with dark grey, the two colors about equal in amount; there is a faintly indicated pale dorsal band, on each side of which the dark mottling is heaviest; on each side at about 2 mm. from the margin, there is a very faint suggestion of a dusky stripe. The underside is pallid, with a dusky suffusion toward the sides of the hyponotum. Upper tentacles dark blue-grey. Stomach not covered by the liver, but rather broadly exposed; course and form of the intestine quite normal, the last loop traversing a little less than a semicircle; filiform glands extremely long (20 mm.), twisted right round the gut, the fully developed ones only five in number, but several other short ones at the base of the bundle.

The sole does not project beyond the end of the body. An apparently distinct species, best known by its narrow form and very long filiform glands. It extends the distribution of the genus about fifteen degrees north in Eastern Africa.

Collected by the Nile, above Khartoum, by Mr. Harold H. King, of the Wellcome Research Laboratories, Khartoum.

NOTES.

ERRATA.—"Land Mollusca of Aldabra," in the October number. Line 4, "Conoro" is a typographical error for "Comoro." Quotation marks should be placed at the beginning of the sentence of line 7, also of each succeeding paragraph and the finish of article.—MAXWELL SMITH.



ANODONTA DAKOTA FRIERSON.

The Nautilus.

Vol. XXIII. FEBRUARY, 1910. No. 9

A COLLECTING EXCURSION NORTH OF THE GRAND CANYON OF THE COLORADO.

In August last Messrs. J. H. Ferriss and L. E. Daniels set out to extend the work begun by Ferriss and Pilsbry in 1906. From Bass' Camp they crossed the Grand Canyon of the Colorado; scaled the northern rim, explored and collected in the Kaibab and Kanab plateaux, finally reaching Kanab, in southwestern Utah. Beyond the Grand Canyon, where we had worked in 1906, this was all a virgin field conchologically. An account of their journey is here extracted from a letter received from Mr. Ferriss.

Friend Pilsbry:

The Arizona expedition of 1909 is in the offing, to use a nautical term. We felt worried until your letter was found at the end of the trip. There was some danger of getting lost in the desert in an effort to find us. A settler with a team from Mt. Trumbull a day ahead of us was three days without water and just about all in when he reached the Pipe Springs. We supposed you would come the back-door route by Salt Lake so that in coming or going you would pick up the Oreohelix found by Hemphill.

Unexpectedly we made the trip to Mt. Trumbull via Fredonia, Arizona and Kanab, Utah, and thus found the guide we had picked out watching for you. On a side trip I went up to the lakes in the mouth of caves along the Kanab Wash north of these villages, and from what I saw and heard it will be an interesting conchological trip along the mountains all the way to Salt Lake. It was at these cave lakes that I found *Succinea hawkinsi* of British Columbia. We heard of Oreohelix with a long nose but did not find them.

There must be a difference in the anatomy of different lots of *Succinea avara* sent in. We found it plentiful on the ant hills in the Antelope valley, a desert as dry as the St. Simon valley. Again on the hottest and dryest of mountain rock at the Hurricane Fault. Still again we found it with *Oreohelix* at the Big Springs in the Kaibab Mountains living in as moist a situation as we find *Polygyra multilineata*. These were of a different color, larger and more corpulent.

After this I hope to go into strange countries with U. S. Geological folios in addition to the contour maps, for the whole Mt. Trumbull country was of lava formation, barren of shells except the small truck. We need limestone and shelter in our business. The Hurricane Fault had lime but no shelter and was equally as barren. This Trumbull side-trip took half of our time and cost a lot of money, but we enjoyed it. We love the Mormons, at least their cooking, and I am now physically perfect until next August.

I will send you a map marking our collecting stations. There were 113 of these. Oreohelix was found at perhaps 100 stations and 80 of these are unlike any other colony in color, size or architecture, while each colony is reasonably uniform individually. We had a theory when we left the Two Springs canyon that the shells were small and dark in the higher altitudes and that they grew larger in a regular ratio as we passed to the lower levels, but in the Warm Springs Canyon the shells were largest at the upper stations and smaller at the lower. In the Snake Gulch they were smallest at the midway stations, and in Quaking Asp canyon it was a skip about between large and small. At Castle Springs, heavily shaded and in elderberry bushes, we found the largest. At Big Springs, facing the sun, moisture abundant, they were small with many albinos. Thus as to elevation, shade, moisture, soil or food we have no theory except like old-time chickens they may just happen to be large, small and middling, ring-banded, streaked or speckled. Our largest measured 30 mm. diam. and our smallest 8 mm. In the Huachucas the colonies of *Oreohelix* are of mixed forms, but the Kaibab shells are of one kind in each colony, with occasional albinos. Some of the colonies apparently divided their rock slide territory into families, designated by size or color. In one instance passing around the point of a rock, less than one hundred feet, and good traveling for snails, the colony on one side was as large again in size as those upon

the opposite side. Our prettiest shells are pure white with a green, transparent band, like Clapp's Maine find of *Helix hortensis*.

The Sonorellas were in small colonies and hard to dig. We did not find any after leaving the north rim of the Grand Canyon and the Kaibab-Powell Saddle. Powell and Kaibab plateaus are fairly level and I have never seen anything more beautiful in timber landscapes. Powell is covered with a heavy growth of large yellow pine. In the Kaibab plateau or mountains, better known in Arizona as Buckskin Mountains, blue spruce and quaking aspen with the pine lend variety to the scenery. No landscape artist in Fairmount Park could manage the grouping better than we saw it in a day and a half journey by donkey, down the Snake Gulch (known as Shinamo Canyon on the U. S. maps.)

We camped with E. W. Nelson and C. Birdsi of the biological survey of the U. S. Agricultural Department at Mt. Trumbull. Here we learned that the tufted-eared squirrel of the Kaibabs was *Sciurus alberti* var. *kaibabensis*. It is the largest American squirrel, black as silk with a white tail. A chattering chickaree is black throughout, and there are four chipmunks and a blue grouse. Deer were about as common as cattle, and as tame, for the Kaibabs are in a game preserve. The plains about Trumbull are populated with wild horses and these are common game, to be had for the catching.

Again I visited the Grotto [on White Creek, a branch of the Grand Canyon] and took more of the maidenhair fern. It seems to be a new species, and it so happens I am working at that group. The Grotto and creek have been filling up with gravel since you and I were there together. They are quite changed since our visit three years ago. From the Grotto, White creek keeps to the north and Muav to the west; heading in the saddle between Kaibab and Powell plateaus. So when you and I slept by the fire and found the colony of Sonorellas we were in the Muav Wash and more than half way to the north rim of the Grand Canyon. About a mile above our sleeping place, there is a fine trout stream (without fish) and cliffs a thousand feet high, with Sonorellas.

There were no mice this time at our old thousand-mouse camp on Shinamo creek.[1] We saw but two on the whole trip. Thus John had a fine orchard with leaves on the trees this time, also melons, sweet potatoes and common things in plenty. Their asbestos mine

[1] On the north side of the Grand Canyon, near the river.

is very promising but it is a long road to consumption for the copper. We found a half million dollar copper smelter in the Kaibabs and a saw mill, but only two men in the mountains besides the foresters, and these were at the saw mill. They had a wagon road to Fredonia. In fact you can wagon from the top of the Kaibab saddle to Fredonia or most any other place in that region. An auto was driven through from Salt Lake while we were there to Bright Angel, on the north side of the canyon across from the hotel. But from Bass Station to Trumbull, 125 miles, there will be no inhabitants through the winter, except Bass and John working out assessments on new mines.

Yours Truly,

JAS. H. FERRISS.

A NEW VARIETY OF LYMNAEA STAGNALIS.

BY FRANK C. BAKER.

LYMNÆA STAGNALIS LILLIANÆ var. nov.

Lymnæa stagnalis var., DANIELS, NAUTILUS XXII, p. 120 (1909).

Lymnæa stagnalis var., WALKER, Ann. Rep. Mich. Geol. Surv., 1908, 289, figure 63, No. 1 (1909).

Shell elongate-ovate, with short spire and elongated, narrow aperture, which is typically longer than the spire; whorls flattened, elongated, very flat-sided and sloping, especially the body whorl which is cylindrical; spire sharply acuminated; whorls $5\frac{1}{2}$ to 6; body whorl elongated, flattened, roundly shouldered; aperture long and narrow, slightly expanded; axis strongly gyrate; umbilical region with a very minute, narrow chink; sculpture and nuclear whorls as in *stagnalis appressa.*

Length, 42.00; width, 22.00; aperture length, 26.00; width, 13.00 mill.

Length, 40.00; width, 19.50; aperture length, 23.50; width, 11.75 mill.

Length, 39.00; width, 20.00; aperture length, 24.50; width, 11.00 mill.

Length, 37.50; width, 19.50; aperture length, 23.75; width, 12.00 mill.

Length, 40.00; width, 19.00; aperture length, 23.25; width, 11.50 mill.

Length, 28.00; width, 13.00; aperture length, 17.50; width 8.50 mill.

Types: Chicago Academy of Sciences, five specimens, No. 24554.

Type Locality: Tomahawk Lake, Oneida County, Wisconsin.

Range: Michigan and Wisconsin north of the 45th parallel of north latitude.

Records.—Michigan: Isle Royale; various localities. (Adams; Gleason; Walker).

Wisconsin: Quynoch Point, Eagle Bay, and other portions of Tomahawk Lake, Oneida County (Baker).

Ecology: L. s. lillianæ is typically an inhabitant of sandy shores, in shallow water, where it is subjected to heavy wave action, only once was a specimen found in a still-water habitat, and this instance was undoubtedly caused by drifting from its normal habitat. When any number of specimens were found, the habitat was invariably an exposed beach. Associated with *lillianæ* were *Galba emarginata* and *Planorbis binneyi*. Individuals were observed crawling over the sandy beach or attached to water-soaked logs or other shore debris.

The animal of this race exhibits two color phases, one bright yellow and the other black or grayish-black. No cause for this color dimorphism was apparent. It is not protective as both forms occupy the same area of white sandy beach.

(*To be continued.*)

DESCRIPTION OF A NEW SPECIES OF ANODONTA.

BY L. S. FRIERSON.

ANODONTA DAKOTA, n. sp. Plate X.

Shell elliptically rounded before (slightly cut away below) dorsal line nearly straight, base slightly curved. Posterior nearly straight, making the shell trapezoidal in outline. Epidermis straw yellow, with dark bands marking the rest periods.

Umbonal ridge angular, beaks not high, with double loop sculpture, as in *Ano. grandis*, Say.

Umbos inflated, greatest diameter of shell about $\frac{1}{3}$ from beak to base.

Length, 3; height, 1.8; diameter 1.6 (inches).

Length 76, height 51, diameter 40 mm.

Found by Mr. W. H. Over, at Ulvers Point, Clear Lake, Deuel Co., South Dakota, July 1, 1909.

To launch a new *Anodonta* is a perilous undertaking, but in this instance the novelty of the form is unmistakable. The beaks ally the shell, of course, to *Anodonta grandis*, Say. It is nearest to that form called by Mr. Anthony *A. subgibbosa* (and especially to the figure of this species shown in the Conchologia Iconica, which is much more characteristic than the figure in the American Journal of Conchology). From any form of *Ano. grandis* it differs in being more cylindrical, *i. e.*, in lacking the swelling "amidship" so often shown by *A. grandis*; in being rayless (so far as known), but especially by having its posterior point not elevated above the basal line, and by the marked truncation posteriorly, which truncation is as marked as in *Morgaritana morginata* Say, and the straight posterior, and the resulting quadrilateral aspect of the shell. It is more quadrate than *Anodonta doliaris*, Lea. The lack of any *obliquity* is remarkable. Mr. Over also sent me from the same lake examples of *Anodonta grandis*, Say, and the facies of our species was strikingly dissimilar.

A NEW SYSTEM OF THE UNIONIDAE.

BY DR. A. E. ORTMANN, CARNEGIE MUSEUM, PITTSBURGH, PA.

Since October, '09 the present writer has been engaged in the study of the anatomy of the soft parts of the *Unionidæ* of Pennsylvania, collected during the last four years. The material at hand being very rich, it was possible to make out the structure of most of our species, and the results obtained are rather satisfactory, and are apt to furnish new principles for the systematic arrangement of the species.

Simpson (Pr. U. S. Nat. Mus. 22, '00). in his system, has indicated some of the essential principles of classification, in fact, the first pointed out *the* most important feature, the shape of the *marsupium*, Yet this system must be changed considerably, if it is to represent the natural affinities. This is due chiefly to the fact, that Simpson. on the one hand, had rather insufficient material, and on the other, that he did not go into microscopic detail.

Some corrections of Simpson's system have been advocated by Sterki (Amer. Naturalist 37, '03 p. 103 ff.), and, generally, I find that these are well supported. Yet there are other differentiations in structure, which have been overlooked hitherto, and which are of prime systematic value.

The most important (and gratifying) result of my investigations is, *that the gills or parts of gills, which serve as marsupium during the breeding season, are permanently differentiated in their anatomical structure from those gills (or parts of gills), which never serve as marsupium.* Thus it is possible to recognize the type of marsupium of any species, if only sterile females are at hand.

My investigation will be published in full in the "Memoirs of the Carnegie Museum," amply illustrated by figures of the structures discussed. Although I am not quite done yet, and although I hope to secure additional material next summer, I think it advisable to publish my preliminary results as soon as possible, in order to direct the attention of the collectors to those genera, which I have not been able to investigate. It would be desirable for anybody, who intends to collect *Unionidæ* next summer, to make up his mind from the beginning, that shells without the soft parts are not the thing that is wanted, but that the soft parts, at least of some specimens, should always be preserved in alcohol.

The family *Unionidæ*, in Simpson's sense (l. c., p. 514, 515, 516), is accepted. Simpson divides it into two subfamilies, of which one, *Hyriinæ* (= *Hyrianæ* Swains., Simpson, pp. 515 and 806), is extralimital, and which cannot be discussed at present. The other is the *Unioninæ* Swains. All our North American forms belong to the latter. But I think they should be divided into four groups, which I would designate as subfamilies. Thus, disregarding the *Hyriinæ*, the *Unionidæ* are divided into four subfamilies, as shown below.

In the following I shall give a systematic arrangement of the Pennsylvanian species. Of the characters, I have given the most important ones of the soft parts for the subfamilies, and for the genera where necessary. It is not my intention to go into any detail, since further investigations may possibly necessitate minor changes in the arrangement of the genera. Some notes are appended at the end, in order to explain the most striking changes introduced here.

1. Subfamily: MARGARITANINÆ.

Gills *without well-defined water tubes;* connections of the two laminæ by irregularly scattered prominences, but not by septa. (This is a most remarkable character, in which *Margaritana* differs from all other genera.) Supra-anal opening not separated from the anal opening. Diaphragm (posterior part of gills, separating anal and branchial openings) of peculiar shape: *the outer lamina of the outer gill is free from the mantle for a considerable distance.* Inner lamina of inner gills free from the abdominal sac. No papillæ on edge of mantle in front of branchial opening. (Marsupium and glochidia unknown to the writer.)

Genus and species: *Margaritana margaritifera* (L.).

2. Subfamily: UNIONINÆ.

Gills with rather *well-defined water tubes*, the latter formed by septa, which run the whole width of the gill, parallel to the gill-filaments. Supra-anal opening not separated or (generally) separated from the anal, the closed part rather short. Diaphragm normal (*i. e.*, outer lamina of outer gills connected with the mantle to their posterior end). Inner lamina of inner gills always free from abdominal sac. No papillæ on mantle edge in front of branchial opening. *Marsupium formed by both gills or only by the outer gill; edge of marsupium always sharp* (not distending). Water tubes not divided in the gravid female. *Glochidia* semioval or semicircular, without spine.

1. Genus: *Quadrula* (Raf.) Ag. (restr.). Both gills (inner and outer) serving as marsupium.

   Species: *subrotunda* (Lea) [and var. *kirtlandiana* (Lea)]—*rubiginosa* (Lea) [and var. *trigona* (Lea)]—*pustulosa* (Lea)—*metanevra* (Raf.)—*cylindrica* (Say)—*tritogonia* (Ortm)[1]—*undulata* (Barn.).

2. Genus: *Rotundaria* Raf. (as subgenus). Outer gills only serving as marsupium. Supra-anal opening not separated from the anal. Also with peculiar shell characters.

---

[1] *Quadrula tritogonia* Ortm. = *Tritogonia tuberculata* (Barn.) of Simpson. The nomenclature of this species remains to be settled. Since *Qu. tuberculata* (Raf.) is now removed from the genus *Quadrula*, the specific name *tuberculata* might become available. *Qu. lachrymosa* (Lea) probably is also a true *Quadrula*.

Species: *tuberculata* Raf.

3. Genus: *Pleurobema* (Raf.) Ag. (enlarged). Outer gills serving as marsupium. Supra-anal separated from the anal.

Species: *cooperiana* (Lea)[1]—*æsopus* (Green).
obliqua (Lam.) [including the form *pyramidata* (Lea) and the var. *coccinea* (Conr.).[2]
clava (Lam.).

4. Genus: *Unio* Retz.[3]

Species: *crassidens* (Lam.)—*gibbosus* (Barn.)—*complanatus* (Dillw.)—*productus* (Conr.) (Fulton Co., Pa.).

3. Subfamily: ANODONTINÆ.

Water-tubes similar to those of the *Unioninæ*, only less regular at base of gills, chiefly so in the male. Supra-anal opening well separated from the anal; sometimes the connection of the mantle margins is very long. Diaphragm normal. Inner lamina of inner gills generally free from the abdominal sac, sometimes with the tendency to become connected with it, or entirely connected. No papillæ on mantle edge in front of branchial opening. *Marsupium formed by the outer gills; edge of marsupium, when charged, distending, the thickened tissue forming the edge stretching out in a direction transversal to the gills*, but not bulging out beyond the edge of the gill (or only slightly so). Water-tubes in the gravid female *divided longitudinally into three tubes*, one lying toward each face of the gill, the third in the middle; only the latter contains eggs or embryos, and is much larger than the outer tubes. This division into three parts is not present in the sterile female. *Glochidia* subtriangular, with one spine at the tip.

1. Genus: *Alasmidonta* Say.[4]

---

[1] *Pleurobema cooperiana* (Lea) (= *Qu. cooperiana* of Simpson) surely groups with *Pl. æsopus*.

[2] *Pl. obliqua*, *pyramidata* [and also *plena* (Lea)] form a natural group by themselves, and probably are one and the same species. *P. pyramidata* is only an extreme variation of *P. obliqua*, with which it occurs, while *coccinea* is a good ecological variety, which, however, runs into *obliqua* at certain localities.

[3] The characters of the soft parts of *Unio* are practically identical with those of *Pleurobema*. A distinction is possible only by shell characters.

[4] The genera of the *Anodontinæ* are distinguished chiefly by shell characters, but it seems as if *Alasmidonta* and *Strophitus* are more closely allied to each other, and then again *Symphynota*, *Anodontoides* and *Anodonta*.

Species: *heterodon* (Lea)—*marginata* (Say) [and var. *varicosa* (Lam.)]—*undulata* (Say).[1]

2. Genus: *Strophitus* Raf.[2]
   Species: *undulatus* (Say) [= *edentulus* (Say)].
3. Genus: *Symphynota* Lea.
   Species: *compressa* (Lea)—*viridis* (Conr.).[3]
   costata (Raf.)—*complanata* (Barn.).
4. Genus: *Anodontoides* Simps.
   Species: *ferussacianus* (Lea) (and var. *subcylindraceus* (Lea).
5. Genus: *Anodonta* Brug.
   Species: *cataracta* Say.—*grandis* Say (with several varieties) *imbecillis* (Say.)[4]

4. Subfamily: LAMPSILINÆ.

Water tubes similar to those of the *Unioninæ*. Supra-anal opening separated from the anal, rarely entirely closed. Diaphragm normal. Inner lamina of inner gills rarely more or less free from abdominal sac, generally entirely connected with it. Mantle edge in front of branchial opening crenulated, *papillose, or with a peculiar flap. Marsupium formed by the outer gill, or (mostly) by the posterior part of the outer gill* (sometimes only a section of the latter is used for the marsupium). *Edge of marsupium, when charged, rounded, distended and bulging out beyond the ends of the branchial filaments.* Water tubes in the gravid female simple. *Glochidia* generally of the type of the *Unioninæ*, rarely different, and rectangular with two spines.

1. Genus: *Ptychobranchus* Simps.[5]
   Species: *phaseolus* (Hildr.)

---

[1] *Alasmid. heterodon* stands by itself, while *marginata* and *undulata* are more closely related.

[2] The marsupium of *Strophitus* is very peculiar and complex, and cannot be explained in a few words and without figures. The discharge of the "placentæ" ("ovisacs" of Simpson) is *not* through the walls of the gills, as Simpson indicates (l. c., p. 616).

[3] *Symphynota compressa* and *viridis* are *hermaphrodites!*

[4] As already Sterki has shown, *Anodonta imbecillis* is a *hermaphrodite*, which I am able to confirm. I know another species of *Anodonta*, from Texas, which is also hermaphroditic; it groups with *imbecillis*, and belongs possibly under *A. henryana* Lea (or may be a new species).

[5] The peculiar character of the marsupium of *Ptychobranchus* is well known; this form reveals what is essential in the *Lampsilis*-type of marsupium. The genus *Cyprogenia* Ag., which I had no chance to investigate, very likely should follow after *Ptychobranchus*.

2. Genera: *Obliquaria* (Raf.) Simps.—*Plagiola* (Raf.) Ag.—*Obovaria* (Raf.)[1]
   Species: *Obliquaria reflexa* Raf.
   Plagiola securis (Lea)—*elegans* (Lea).
   Obovaria retusa (Lam.)—*circulus* (Lea)—*ellipsis* (Lea).
   Obovaria ligamentina (Lam.)[2]
3. Genus: *Proptera* Raf.[3]
   Species: *gracilis* (Barn.)—*alata* (Say.
4. Genus: *Carunculina* Simps. (subgen.)
   Species: *parva* (Barn.)[4]
5. Genus: *Micromya* (Ag.) Simps.
   Species: *fabalis* (Lea.)[5]
6. Genus. *Lampsilis* Raf. (restr.)[6]
   Species: *iris* (Lea)—*nasuta* (San)—*recta* (Lam.)[7]
   luteola (Lam.)—*radiata*(Gmel.)—*orbiculata* (Hildr.)[8]

---

[1] These three genera are practically identical with regard to their anatomy, only *Obliquaria* is distinguished by the marsupium consisting only of a few ovisacs. They may be distinguished by shell characters, which, however, are hard to define. All the species enumerated here are characterized by the *absence of papillæ or flaps on the mantle edge* in front of the branchial opening. A final arrangement of the genera must be left for the future.

[2] *Obovaria ligamentina* = *Lampsilis ligamentina.* This species undoubtedly belongs into this group, and *not* with the true *Lampsilis.*

[3] *Proptera*, as defined by Sterki. *P. alata* is distinguished by its peculiar glochidia (rectangular, with two spines). But *P. gracilis*, which agrees in all other respects, has different glochidia; they are of the normal *Lampsilis*-shape, *but much smaller.*

[4] *Car. parva* has the inner lamina of the inner gills not connected with the abdominal sac, and the supra-anal opening is entirely closed; for the rest it resembles the *iris*-type of *Lampsilis.*

[5] *Micromya fabalis* agrees well with the *iris*-type of *Lampsilis*, but the inner lamella of the inner gill is partly free from the abdominal sac. Both *Carunculina* and *Micromya* form a transition from the more primitive forms to the typical *Lampsilis.* Further study possibly will throw more light upon these forms.

[6] *Lampsilis* is characterized by the development of peculiar structures on the mantle edge. The first group has papillæ, the second a flap.

[7] Also *Lampsilis vibex nigrina* (Lea) from Florida and *L. anodontoides* (Lea) from Texas have been investigated, and prove to belong to this group.

[8] *L. orbiculata* is not at all related to *L. ligamentina*, as Simpson thinks, but it belongs to the *ventricosa* group of *Lampsilis*, for it has a well-developed flap on the mantle edge.

cariosa(Say)—*multiradiata*(Lea)—*ventricossa*(Barn.) and var. *ovata* (Say).

7. Genus: *Truncilla* Raf.[1]
   Species: *triquetra* Raf.—*perplexa rangiana* (Lea).

NOTES AND NEWS.

The Wendell Phillips High School, Chicago, in its regular Zoology work is doing things unique with the mollusca. Each pupil is required to make a "cigar box" collection of shells. These are fixed up nicely and covered with glass. The specimens are named on inside of lid and an exhibition takes place to which parents and friends are invited. This year over 200 boxes and 8000 specimens were exhibited.

The students under the direction of Mr. E. E. Hand, the teacher are urged to make a thorough study of their own region and in cooperation with the Agassiz Association are arranging for exchanges with high schools and individual collectors all over the world. Anyone interested is invited to correspond.—E. E. Hand.

It is with sorrow we record the death of Mr. John Ford, at his home in Philadelphia, on January 10, 1910. An obituary will appear in March number.

We also regret to announce the death of Dr. John H. Britts of Clinton, Missouri, which occurred November 14, 1909.

Lymnæa cubensis aspirans, n. subsp. The shell differs from *L. cubensis* by its much longer spire of very convex whorls. Length 12, diam. 6, length of aperture 6 mm.; whorls 6. Barbadoes. Types No. 85455 A. N. S. P. This is not *Limnæa barbadensis* Sowerby, Conch. Icon., xviii, pl. 14, f. 100. I have seen no Antillean species resembling that figure.—H. A. Pilsbry.

We learn with regret of the death of Dr. Kakichi Mitsukuri, the eminent Japanese zoölogist, on September 16.

---

[1] Shell characters peculiar, and also mantle edge, and in some respects also the marsupium. The two species differ considerably, and the two subgenera of Simpson (*Truncilla* and *Pilea*) should perhaps be elevated to the rank of genera.

JOHN FORD.

The Nautilus.

Vol. XXIII. MARCH, 1910. No. 10

A NEW FOSSIL MITRA FROM WEST FLORIDA, AND A NEW EOCENE ASTARTE.

BY T. H. ALDRICH.

Mitra (Chrysame) waltonensis, n. sp. Pl. XI, fig. 1.

Shell rather solid, thick; apex scarcely pointed. Whorls six, three smooth, balance cancellated and shouldered, suture deep; varices near the aperture predominating over the spirals and appressed to the suture. Aperture with strong outer lip which is serrated on its outer edge and showing seven or eight strong lirations within; inner lip curved and covered with a strong enamel which spreads over part of the body whorl, two strong quadrangular folds on the lower central part and a pointed tooth near the posterior part of the aperture, base rounded, shell slightly umbilicated.

Height, 16 mm.; breadth, 9 mm.; length of aperture, 9 mm.

Locality: Shoal River bed, West Florida. Oligocene of Dall.

Remarks.—This is another Pacific Ocean form that adds to the evidence of a channel between the two oceans during the Tertiary period.

Astarte newtonensis, n. sp. Pl. XI, figs. 2, 3.

Shell small, rounded, nearly equilateral; beaks small, lunule rather long, the concentric ribs dying down at the edge, but the lines of growth run over to the hinge line and do the same on the escutcheon also. Valves moderately convex, sculptured with numerous small subequal ribs, inner margins crenulate, hinge as in the figure.

Height, 6 mm.; length, 7½ mm.

Locality: From the "Burrstone," near Beulah P. O., Newton County, Miss.

Remarks.—This little species is strikingly similar to the species named ASTARTE OPULENTORA Dall, but that is from the Pliocene of Mexico.

NOTES ON THE CLASSIFICATION OF THE TORNATELLINIDÆ.

BY HENRY A. PILSBRY.

The *Tornatellinidæ* are a group of small or minute land snails found on the islands in and around the Pacific. An illustrated monograph has been prepared for the "Manual of Conchology," but as its publication will be delayed until the appearance of the *Achatinellidæ*, a brief sketch of the classification is here published in advance.

These shells have some resemblance to *Achatinellidæ* and *Partulidæ* in shape, but differ from both families by having an entering parietal lamella. In at least two species this is absent through degeneration in the adult stage, and in some others it is much reduced. Some species of the section *Lamellina* undergo remarkable changes from youth to maturity, the adult stage being secondarily simplified. Young individuals should always be collected with adults, when possible.

Key to Genera and Minor Divisions.

I. Shell rather *solid*, glossy, bright or dark colored or variegated; axis imperforate, but usually superficially rimate in the adult stage. Genus AURICULELLA Pfr.

II. Shell thin, light brown or corneous, not polished.

a. Axis imperforate, slender, the columella more or less sinuous.

b. Shell globose-ovate; columella armed with an angular or bilobed vertical callus or plate, truncate or excavated below the prominence.

Genus ELASMIAS n. gen.

c. Spire of few (3 to $4\frac{1}{2}$) whorls; columellar callus in form of a vertical, angular or bilobed plate.

Section *Elasmias.*

cc. Spire of 6 to 7 close whorls; columellar callus bilamellate, lamellæ long; palatal plicæ developed. Section *Lamellovum* n. sect.

bb. Shell oblong-conic or turrite, very thin; columella sigmoid or nearly straight, sometimes calloused or bearing lamellæ, not truncate or excavated at base. Genus TORNATELLINA Pfr.

c. Shell oblong-conic; whorls 5 to 7.

d. Aperture having a columellar and a parietal lamella and two palatal folds. Section *Tornatellina.*

dd. Aperture having columellar and a parietal lamella and more or less serrate, vertical, palatal ribs, at least in the neanic stage. Section *Lamellina* Pse.

ddd. No palatal armature at any stage; columella more or less sinuous, sometimes lamellate, whorls 5 to 6. Section *Lamellidea*, n. sect.

cc. Shell long-turrite, whorls 9 to 10. Section *Elasmatina* Petit.

aa. Axis umbilicate or perforate throughout; columella not sinuous or truncate. Genus TORNATELLIDES n. gen.

b. Columella unarmed at all stages of growth. Section *Tornatellides.*

bb. Columella bilamellate, at least in the young. Section *Tornatellaria*, n. sect.

Types of the Genera and Minor Groups.

Frickella Pfr. 1855, type *Achatinella amoena* Pfr.

Auriculella Pfr. 1855, type *A. auricula* (Fér.).

Elasmias Pils. 1910, type *Tornatellina aperta* Pease.

Lamellovum Pils. 1910, type *Tornatellina globosa* (Petit).

Tornatellina Pfr. 1842, type *Tornatellina clausa=bilamellata* (Anton).

Lamellina Pease 1860, type *Lamellina serrata* Pease.

Lamellidea Pils. 1910, type *Tornatellina peponum* (Gld.).

Elasmatina Petit 1843, type *E. subulata* Pet. = *T. turrita* (Anton).

Tornatellides[1] Pils. 1910, type *T. simplex* Pse.

Tornatellaria Pils. 1910, type *T. newcombi* Pfr.

Auriculella and *Tornatellaria* are restricted to the Hawaiian Islands. *Lamellovum* and *Elasmatina* to Rapa. The other groups have a wider range. *Lamellidea* and *Tornatellides* range from the Bonin, Luchu and Hawaiian Islands to New Zealand; *Elasmias* from the Japanese Oceanic Islands to Australia, while *Lamellina* does not go south farther than Micronesia and Polynesia. There are some New Caledonian species of *Tornatellina*, but the absence of records of *Tornatellinidæ* from the Solomons, New Hebrides and other Melanesian islands is remarkable, and must be due to these minute shells being overlooked. The family is represented by a solitary species in the Galápagos.

A CONCHOLOGICAL MUSEUM FOR JAPAN.

BY Y. HIRASE.

As I stated in the late issue of my paper I am going to establish a conchological museum in the near future and I hope I shall be able to contribute a little to this branch of study. Hon. S. Omori, Governor of Kyoto-Prefecture, Dr. H. Kinoshita, Ex-President of the Kyoto Imperial University, Dr. Y. Tanaka, a member of the House of Peers and two or three others of eminence promised to render assistance, if need be, and are in deep sympathy with my undertaking. I am well convinced that I shall be able to carry out my plan and attain my object, the establishment of a conchological museum.

For the building expenses of the museum, I rely for $5,000 upon the generosity of persons interested in science in foreign countries. It is not intended to ask contributions, but to issue sets of Japanese shells, the proceeds to be applied to the museum.

Each lot or set contains 500 species of Japanese shells, valued at $100. Many sets are prepared and can be sent as soon as I receive orders. As to the 500 species in each set, they shall be subject to selection. Let me hear the names of the species desired.

As already said, I do not wish for cash contributions to the museum.

[1] The term *Tornatellides* differs sufficiently in spelling and etymology from *Tornatelloides* Pfr.

Yet such donations as specimens of shells, shell fancy-work, books, papers and pamphlets which have descriptions or pictures of shells, etc., will heartily be welcomed. They shall be arranged in cases in the museum, carefully preserved and duly credited to the donors.

Kyoto, Japan.

A NEW VARIETY OF LYMNAEA STAGNALIS.

BY FRANK C. BAKER.

(*Concluded from page 113*).

Remarks: Lymnæa stagnalis lillianæ may be known by its short spire, long and narrow aperture, and compressed body-whorl. It was at first thought to be a form of *sanctaemariae*, but a comparison with that species shows it to be uniformly narrower with compressed body-whorl, and more acute spire. In sanctaemariae the body-whorl is always very rotund; the aperture is also roundly ovate, while in *lillianae* it is elongate-ovate. The musculature of the male organ is also quite different from sanctaemariae, and similar to that of appressa. *Lillianæ* differs from *appressa* in its short spire, flattened and compressed body-whorl and elongated aperture. It appears to be a distinguishable race of *L. stagnalis.*

No true *appressa* were found associated with this race in Tomahawk Lake. There were a few specimens with spires and aperture of equal length, showing clearly that the race is a modification of the *appressa* type, caused, doubtless, by a change of environment.

At Isle Royale, in Lake Superior, a form of stagnalis occurs which at first sight appears quite distinct. A number of individuals, however, approach very closely to var. *lillianæ* and they may be referred provisionally to this race. Judging from the material at hand, this is a transition form between *appressa* and *lillianæ*, representing, perhaps, one of the stages in the evolution of the race. The Isle Royale form "is characteristic of the quieter waters of the long, narrow harbors which are such a remarkable feature of the Island." (Walker). Typical *lillianæ* lives on a wave-beaten shore, and this precarious environment has caused the aperture to become enlarged to provide for the larger foot to enable it to retain its hold on submerged objects. The Isle Royale form, living in quieter water, has not developed the large aperture of the Tomahawk Lake shell.

The Tomahawk Lake shells vary to some extent, those inhabiting the quieter bays having a longer spire and a smaller aperture. These shells closely resemble the Isle Royale specimens and also clearly indicate relationship with *appressa*. Specimens referable to *appressa* were collected at one station in Tomahawk Lake, the habitat being marshy in character. Some pathologic forms occur in the Wisconsin shells, the abnormalities being confined principally to the last whorl and aperture. Specimens from Lake Harriet, Minnesota, collected by Mr. L. E. Daniels, are also referable to this race.

In the course of time this race will probably assume specific characteristics. Its remarkable uniformity points to this.

The race is dedicated to my wife, who assisted in the discovery of the type specimens.

JOHN FORD.

John Ford was born in Chester, Pa., November 15, 1827, and died in Philadelphia, January 10, 1910. He was the son of Lewis H. and Esther (Ogden) Ford. His father died when he was about ten, and he was then practically compelled to shift for himself. He lived for about three years with a farmer in Delaware county, Pa., and then returned to Chester and entered a store. By untiring efforts the boy acquired a substantial education. His great love of nature and of music was a powerful incentive to self-cultivation.

On September 6th, 1847, Mr. Ford married Phoebe T. Flavill, of Chester, Pa. After living for a time in Paterson, N. J., and Shipman, Ill., he returned to Philadelphia in 1861, shortly after entering the Corn Exchange National Bank, where he was continuously employed until July, 1903, when, owing to a severe illness, he was compelled to retire from active business.

Mr. Ford was afflicted for many years by an ever-increasing deafness, which caused him to avoid social gatherings, and in his later years even scientific and musical meetings. Yet his warm and generous nature found pleasure in the company of a few intimate friends who shared his tastes.

Mr. Ford was an accomplished musician, many of his compositions having much merit. He especially excelled in melody. Many of his songs written over thirty years ago are still in favor. His first pub-

lished song, "Will You Love Me when I'm Old?" had a tremendous and immediate success, and was by far the most popular of his compositions, though a number of those appearing later were deemed more worthy of consideration by his musical friends. Among these were "Watching and Waiting," "Daisy and I," "Away Down South," "Sweet Rosalie," and, best of all, "My Ships are Coming Back to Me"—a piece of deep poetic feeling.

As a young man, Ford was deeply interested in geology and mineralogy. A warm friend of Conrad, together they collected cretaceous fossils from the marl beds of New Jersey. With the late Theodore D. Rand he collected the minerals of Delaware and Chester counties. In the early sixties Ford met the Rev. Dr. E. R. Beadle. This acquaintance ripened into a warm friendship, and turned his attention from mineralogy to conchology. He often said—"It was Dr. Beadle who started me in the study of conchology, and who took all my minerals in exchange for shells." George W. Tryon, Jr., was also his warm friend, and their bond of friendship was strengthened by their love of music. Another true and life-long friend who survives him is Mr. Charles Morris, of Philadelphia.

Mr. Ford was elected a member of the Academy of Natural Sciences in 1866 and from that time until his illness in 1903, took an active interest in the Academy's magnificent collection of mollusks. He was especially interested in the local species and those of the New Jersey coast, making a special exhibition collection of both, for the Academy and also for the Wagner Free Institute of Science. Aside from the local shells he was also especially interested in the *Olividæ*. His long suites selected to show specific variation are unequaled in this country.

He also brought together a very fine collection of *Cypræidæ*, which although containing none of the great rarities, is notable for its large series illustrative of variation. His entire collection is remarkable for the perfection of the specimens and the great number of representive genera and species of all the principal faunal regions. He had little interest in fresh-water shells, aside from local species, or for the small or minute land snails, though he possessed a very fine series of exotic Helices and Bulimi, numbering many forms now very rare. The marine pelecypods such as *Veneridæ*, *Cardiidæ*, Pectens, etc., of his collection are especially fine.

Mr. Ford published 29 articles on conchological subjects, besides

a number of short notes, and a few articles dealing with paleontological and archaeological topics. His influence was largely personal. At the time of his greatest activity in conchology—1870 to 1895—he maintained a large correspondence, and was always ready to assist students with information from the rich library of the Academy. He was particularly helpful in naming specimens for conchologists who had no access to large collections or libraries, much of his leisure being given to this generous propaganda. Several species were named in his honor, among them *Donax fordi* Conrad, *Cerion fordi* P. & V., *Drymæus fordi* Pils. *Pleurodonte fordiana* Pils., *Phasianella fordiana* Pils., and others.

The portrait accompanying this sketch, is from his last photograph, taken when Mr. Ford was about sixty years of age.

He is survived by two sons William Henry and Albert W. Ford and two daughters Parthenia Ford and Mrs. Charles W. Johnson.

List of the Conchological Writings of John Ford.

1. Remarks on the Argonauta. Amer. Journ. of Conch., IV, 276, 1868.

2. Embryology of Fulgur, etc. Proc. Acad. Nat. Sci. Phila., 1884, p. 292.

3. A Day among the Mollusks. Conch. Exch., I, 21, 1886.

4. Helices in Fairmount Park, Philadelphia. Conch. Exch., II, 7, 1887.

5. Succinea obliqua Say in Fairmount Park, Philadelphia, with some Remarks regarding the Relationship of Succinea totteniana Lea. Conch. Exch., II, 23, 1887.

6. The Fresh-Water Mollusks of Fairmount Park. Conch. Exch., II, 39, 1887.

7. Some Remarks on the Migration of Mollusks. Conch. Exch., II, 71, 1887.

8. Description of a New Ocinebra. Proc. Acad. Nat. Sci. Phila., 1888, p. 188, fig.

9. Description of Helix (Trachia) dentoni. Nautilus, III, 17, 1889.

10. List of Shells of the New Jersey Coast South of Brigantine Island. Naut., III, 27, 1889.

11. Scalaria angulata in New Jersey. Naut., III, 52, 1889.

12. Remarks on Oliva inflata, O. irisans, and Other Species of Shells. Proc. Acad. Nat. Sci. Phila., 1889, p. 137.

13. Notes on Crepidula. Proc. Acad. Nat. Sci. Phila., 1889, p. 346.

14. On Crepidula glauca. Naut., III, 90, 1889.

15. A Few Last Words on Crepidula. Naut., III, 128, 1890.

16. A Glance at the Academy of Natural Sciences of Philadelphia. Naut., IV, 75, 1890.

17. Description of a New Anctus. Naut., IV, 81, 1890.

18. Some American Cannibals. Naut., IV, 85, 1890.

19. Description of a New Species of Helix [H. deaniana]. Proc. Acad. Nat. Sci. Phila., 1890, p. 188.

20. Description of New Species of Anctus and Oliva. Proc. Acad. Nat. Sci. Phila., 1891, p. 97, figs. 1, 3 and 4.

21. Some Remarks on New Jersey Coast Shells. Naut., VI, 25, 1892.

22. Description of a New Form of Cypraea. Naut., VI, 112, pl. 2, figs. 4, 5, 1893; VII, 39, 1893.

23. Remarks on a New Species of Cypraea. Proc. Acad. Nat. Sci. Phila., 1893. p. 310, fig.

24. Some Remarks Relative to Cypraea greegori. Naut., VII, 78, 1893.

25. A New Variety of Olivella. Naut., VIII, 103, pl. 2, fig. 14, 1895.

26. Notes on the Reported Extinction of the Genus Achatinella, and Marvelous Development of a Florida Fasciolaria. Naut., VIII, 123, 1895.

27. Some References to the Genus Oliva. Naut., X, 3, 1896.

28. Cypraea lynx deformed by Disease. Proc. Acad. Nat. Sci. Phila., 1897, p. 328, figs. 1–3.

29. Description of a New Species of Olivella. Naut., XII, 66, 1898.

H. A. P.

PUBLICATIONS RECEIVED.

Some New South American Land Shells (Smiths. Misc. Coll., vol. 52, p. 361–364, 1909). By Wm. H. Dall. *Pleurodonte tenaculum* and *Helicina heighwayana* are described from the Atrato River, Sierra Darien. The former seems closely related to *P. uncigera* Petit, having a remarkable hook within the basal lip, like that species. The altitude of the shell assigned (6.0 mm.) must be a typographical error. *Odontostomus branneri* is a new form from the province of Bahia, Brazil.

Report on a collection of shells from Peru, with a Summary of the Littoral marine Mollusca of the Peruvian Zoological Province. By William Healey Dall: Proc. U. S. N. M. 37, p. 147–294, Pls. 20–28, 1909.—Dealt with in his usual masterly way, this paper of Dr. Dall is one of the most notable contributions to the fauna of Western South America which has appeared for some years. Ostensibly but a report on the relatively small collection of shells collected by Dr. R. E. Coker, the scope of the paper has been widened, first by the addition of a valuable bibliography, and in later pages by the inclusion of a "List of Species Composing the Fauna," prefaced by several pages of the acute generalizations which we have now come to expect in nearly all the larger works of this author. The list of synonyms at the back is also a most useful feature.

As seems inevitable in a work of this scope a few minor errors and inconsistences have crept in, some of which it may be well to call to notice, as well as some of the more important changes in nomenclature which Dr. Dall has found it necessary to undertake.

The inaccuracies are as usual connected chiefly with the list of Cephalopods, which has apparently been compiled from the literature without any attempt at revision or the elimination of synonyms.

By the rules of nomenclature the family name *Philonexidæ* (used on p. 193) can have no standing and the creatures grouped under it must either be referred to the *Argonautidæ*, as most authors now maintain; or if segregated the name *Tremoctopodidæ* should probably be used. At any rate the only species here given under this group, *Tremoctopus minimus* Orb., is a synonym of *Argonauta hians* Sol.

On p. 194, *Bolitaena "microtyla"* is a misprint for *B. "microcotyla,"* and *Polypus "fontaineanus"* for *P. "fontanianus."* On p. 195 *Ommastrephus gigas* d'Orb. is now held the type of a distinct genus *Dosidicus* Steenstrup, 1857. Also *Steenstrupiola chilensis* Pfeffer is regarded by even its author as but the young stage of *Telcoteuthis platyptera* (d'Orb.) which is also listed on the following page. *Onychoteuthis brachyptera* Pfeffer may also be a synonym of this. *Taonius schneehageni* Pfeffer (listed on p. 196) is a synonym of *Zygocranchia zygaena* (Verany) Hoyle, according to Pfeffer, but further specimens may indicate differently.

It is a pity that original figures of *Polypus fontanianus* and *Loligo*

gahi were not given instead of copies of the unsatisfactory drawings of d'Orbigny. (Plates 20–21).

The new species described are *Modiolus arciformis*, *Aligena cokeri*, *Diplodonta* (*Felaniella*) *artemidis*, *Xylotrya dryas* (an interesting form found burrowing in the *living* mangroves), *Bulimulus cokerianus*, *and Megatebennus cokeri*. *Acmaea orbignyi* Dall is a new name for *A. scutum* Orb. 1841 (not Esch (1833), and the commonly used terms *Anomia lampe* Gray, *Concholepas peruvianus* Lam., and *Crepidula unguiformis* Lam. must give way to *A. peruviana* Orb., *C. concholepas* Brug. and *C. crepidula* Linn. respectively.

The nomenclature of the faunal list presents the usual divergencies from that in common use which are already familiar to those who have read Dr. Dall's "Albatross" Report[1] or his notable memoir on the Oregon Miocene,[2] but there are still one or two points which seem difficult to understand, namely the retention of the family "*Aplysiidæ*" after the rejection of *Aplysia* for *Tethys:* the adoption of the family name *Turritidæ*[3] but not *Epitoniidæ;* of *Bullariidæ* and *Alectrionidæ* but not *Architectonicidæ*.

Murex elenensis Dall is a new name for *M. plicatus* Sowerby 1840 (non Gmelin 1791), *Thais peruensis* Dall replaces *Purpura peruviana* Eydoux and Souleyet 1852 (not Blainville, 1832), *Architectonica* (= *Solarium*) *nanum* (Koen) Philippi, 1853 (not Grateloup, 1838) becomes *A. kochii* Dall, *Fissurella aspera* Sowerby 1834 (not Eschscholtz, 1833) becomes *Fissuridea asperior* Dall, and *Chiton bipunctatus* Sowerby 1832 (not Fisher, 1808) is changed to *Tonicella* (*Mopaliella*) *stigmata* Dall. Among the *Pelecypoda*, *Pectunculus minor Orbigny* 1846 (not Lea 1833) becomes *Glycymeris chemnitzii* Dall, and *Donax aricana* Dall replaces *D. radiatus* Valenciennes, 1833 (not Gmelin 1791).

Another interesting point which may be observed in this connection with some propriety is that most writers on the mollusca of our Southeastern and Gulf States seem to have overlooked the fact that the *Siphonaria lineolata* of Orbigny, 1853 is preoccupied by Sowerby 1835. That name should therefore be restricted to the Chilian

[1] Bull. Mus. Comp. Zool. xliii, No. 6, Oct., 1908.

[2] U. S. Geol. Surv. Prof. Pap., No. 59, 1909.

[3] The correct spelling is Turridæ as H. & A. Adams have shown. (Gen. Rec. Moll. II, p. 614, 1858).

species, while the Floridian form will then be known as *S. naufragum* Stearns. The chief synonymy of the two species is as follows:

SIPHONARIA LINEOLATA *Sowerby.*

1835 *Siphonaria lineolata* Sowerby, Proc. Zool. Soc., p. 6.

1856 *Siphonaria lineolata* Reeve, Conch. Icon., v. 9, Siphonaria, Pl. 3, fig. 11.

1909 *Siphonaria lineolata* Dall, Proc. U. S. N. M., v. 37, p. 205.

SIPHONARIA NAUFRAGUM *Stearns.*

1853 *Siphonaria lineolata* Orbigny (*non* Sowerby), Moll. Cuba, I, p. 232, Pl. XVII, fig. 13–15.

1872 *Siphonaria naufragum* Stearns, Proc. Bost. Soc. Nat. Hist., XV, p. 23.

1902 *Siphonaria lineolata* Dall; Proc. U. S. N. M. XXIV, p. 501, Pl. xxvii, fig. 10 and 13.

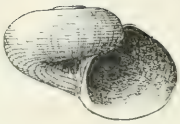
S. S. BERRY, Harvard University, Massachusetts.

THE OPISTHOBRANCHIATE MOLLUSCA OF THE BRANNER-AGASSIZ EXPEDITION TO BRAZIL, by Frank Mace MacFarland (Leland Stanford Junior University Publications No. 2, 1999).—The following species are described: *Tethys dactylomela* (Rang), *T. cervina* Dall and Simpson, *Pleurobranchus agassizi*, *Discodoris branneri*, *D. voniheringi*, *Peltodoris greeleyi* and *Spurilla braziliana* nov. spp. The internal anatomy of all the species is fully described and illustrated with excellent figures. Professor MacFarland's excellent work on Opisthobranchs is making amends for the neglect of the group by American zoologists.—H. A. P.

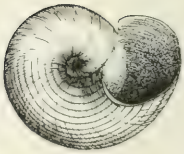
NOTES.

ALBINO OLIVA ANGULATA.—We have recently received for examination a large and perfect specimen of *Oliva angulata* which is snow-white except for a small fleshy-brown stain on the callus at the posterior angle of the aperture and a rusty yellow stain in front of the callus. This albino, which may be called form *nivea*, is the first to be reported of this species, so far as we know. It seems to be an extremely infrequent variation. The specimen measures 83 mm. long, 42.5 wide. It is the property of the A. L. Hettrich Company, of San Francisco.—*H. A. Pilsbry.*

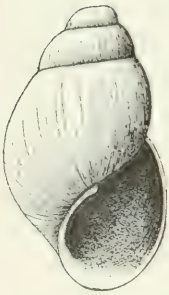
4



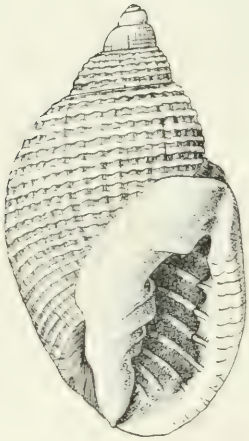
5



6



7

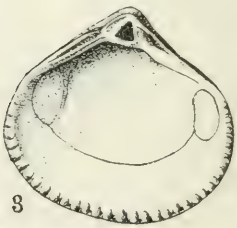


1

9

2

8



3

BARTSCH: NORTHWESTERN MARINE SHELLS.
ALDRICH: NEW EOCENE FOSSILS.

The Nautilus.

Vol. XXIII. APRIL, 1910. No. 11

NEW SPECIES OF WEST AMERICAN SHELLS.

BY WILLIAM HEALEY DALL.

Several new shells have turned up lately in material received from the Pacific Coast, of which descriptions follow.

Olivella (anazora Ducl. var. ?) porteri Dall.

Shell of about the form and size of the east American *O. jaspidea*, with very variable coloration; whorls about seven, spire acute with a very deep and narrow channeled suture not obscured by callus; surface of the whorls brilliantly polished, smooth, except for microscopic spiral close striation which is present on all, but more uniform on particular individuals; color pale olive, yellow, or whitish, with sharp angular axial brown lines superposed between the suture and the basal fasciole, sometimes forming a tent-like pattern and sometimes reduced to fine, close, more or less cloudy zigzags; a pale band in front of the suture, usually with vivid brown zigzag pointed forward, but sometimes plain, the brown lines when present broader and stronger than elsewhere; basal fasciole short, with a marginal and an adjacent narrow fold or plait anteriorly, lighter than the body, yellow or rich bluish purple; aperture narrow, simple, with a deep sutural sinus and a moderate parietal callus when mature. Height of shell 15; of aperture 9; max. diam. 6 mm.

From sandbars near the entrance to San Diego Harbor, and at Scammon Lagoon, Lower California, Miss J. M. Cooke. U. S. Nat. Mus. 209677. Named in honor of Captain George Porter who collected largely in the Gulf of California, and is supposed to have lost his life at Tiburon Island while on a collecting expedition.

The Scammon Lagoon specimens are more grayish than those from San Diego.

The nearest ally to this species is the shell figured by Marrat in the Thesaurus, plate 350, figure 419, under the name of *anazora* Duclos. This, judging by the figure, is a much smaller and somewhat stouter shell, with less distinct markings. The shell represented by figure 411 on the same plate is that identified by Dr. Carpenter and H. Cuming for the Smithsonian collection as *O. anazora* Duclos, though it is named *O. pulla* by Marrat. The heavy white callus on the body extending beyond the suture amply distinguishes it from *O. porteri*. I have not access to Duclos' original paper and hence cannot resolve the doubt as to which is Duclos' *anazora*.

The previously known Californian Olivellae were none of them of remarkable beauty, though some of the Gulf species are very attractive, but the present form is one of the prettiest shells of the coast. It may be that its range extends further north.

POMAULAX TURBANICUS n. sp.

Shell moderately large, rather thin, brilliantly pearly inside, covered with a reddish brown periostracum which becomes olivaceous on the base; form rather depressed, with turgid whorls, about six in all, the nucleus white, blunt, imperfect; base flattened, bordered by a sparsely nodulous carina; sculpture on the spire of slightly protractive, rounded, short, rather elevated riblets reaching about half way forward on the whorl from the suture (17 on the last whorl), ending in or barely separated from the same number of stout nodules at the periphery, with a marked sulcus separating them from a similar row of nodules on the margin of the base; base with four somewhat undulated spiral ridges separated by subequal interspaces, except the inner pair which are smaller and closer to each other; base imperforate, swollen at the base of the pillar; aperture ample; surface of the body erased, leaving visible pearly and white substance; the pillar arcuate, pearly; with no anterior prominence or tooth; outer lip and base simple, sharp; operculum white, rounded, shelly, with three partly gyrate, very prominent, granose, narrow ribs, the spaces between them excavated and smooth. Height of shell 37.5; of last whorl 30.0; of aperture (vertical) 21.5; max. diameter 41.0 mm.

U. S. Fish Commission station 2989, in 36 fathoms, coral, off Magdalena Bay, Lower California. U. S. Nat. Mus. 111242.

This is remarkably distinct from any of the previously known West American species.

PACHYPOMA MAGDALENA n. sp.

Shell conic, the sides of the spire flattened, the base flattened and somewhat concave, the basal margin compressed with a rounded and undulate edge; whorls about seven; the nucleus white, worn, sides covered by a scarlet periostracum which becomes darker on the base; sculpture of about thirty-four subequal protractive low riblets which are cut into elongate nodules by four spiral sulci, the peripheral nodules being longer and most prominent, giving the effect of a pre-sutural band; on the base are four subequal and subequally spaced spiral riblets, which in the young are sometimes nodulous or undulate; pillar pearly, space about it white or pearly, as is the interior of the aperture; the suture laid on the peripheral carina is undulate and in the young the base has a stellate appearance; the periostracum is strongly striate in the direction of growth. Height of shell 38; of last whorl 32; of aperture (vertical) 5; max. diameter 38 mm.

Station 2989, U. S. Fish Commission, with the preceding, U. S. Nat. Mus. 111239.

This is of the same general type as *P. inæquale* Martyn, but more delicate, smaller and more elegantly sculptured. The operculum is essentially like that of *P. inæquale*, which is not authentically reported south of the Santa Barbara Islands.

With these shells were taken two young specimens of *Uvanilla regina* Stearns, (unfortunately not containing the soft parts) thus adding another station to the known range of this excessively rare and beautiful species.

PACHYPOMA LITHOPHORUM n. sp.

Shell small, turbinate-conic, with about six moderately convex whorls, the basal margin being either bluntly rounded or undulately carinate; suture appressed, whorls covered with a reddish periostracum striated in harmony with the incremental lines; sculpture between the suture and periphery of nine closely and prominently beaded, alternately stronger and weaker spiral cords, with only linear interspaces; periphery in the type specimen with three finer threads; the base flattish, with six subequal, more or less undulate or beaded

cords with narrower interspaces; umbilical area imperforate, smooth, slightly excavated, white; pillar arcuate; smooth; aperture very oblique simple, pearly white within; operculum? Height of shell 32.5; of last whorl 20.5; of aperture (vertical) 11.5; max. diameter 36.5 mm.

U. S. Fish Commission station 2983, off Cerros Island, Lower California, in 58 fathoms, sand. U. S. Nat. Mus. 111241.

Of three dead specimens dredged, one had the periphery compressed and roundly keeled, and on the spire were some feeble indications of axial ribbing.

NEW MARINE SHELLS FROM THE NORTHWEST COAST OF AMERICA.

BY PAUL BARTSCH,[1]
Assistant Curator, U. S. National Museum.

In a collection of mollusks submitted to the U. S. National Museum for critical examination, by Dr. Fred. Baker of San Diego, California, collected by him on the Northwest Coast, are several new forms which are here described.

The types of these species have been kindly donated to the National Museum by Dr. Baker.

LEPTOGYRA ALASKANA new species. Pl. XI, figs. 4, 5, 6.

Shell minute, depressed helicoid. Nuclear whorls one and one-half, light yellow horn color, marked by faint incremental lines. A single post-nuclear turn follows which is bluish white, rather broad and gently, almost evenly curved from the well-impressed suture to the periphery. This whorl is marked by about twelve, fine, incised spiral lines between the suture and the periphery which are stronger toward the periphery than at the suture. Periphery of the last whorl rounded. Base broadly and deeply umbilicated, strongly arched, with a slender cord at the junction of the basal and parietal wall, surface of the base marked by incised lines which are equal in strength and number to those occuring upon the upper surface. Wall of the umbilicus almost flat, marked by faint spiral lines.

[1] Published by permission of the Secretary of the Smithsonian Institution.

Aperture very large, subcircular, posterior angle obtuse; outer lip thin; columella curved, somewhat expanded and thickened basally; parietal wall covered with a thin callus. Operculum thin, horny.

Twelve specimens of this species were collected by Dr. Fred. Baker at Port Graham, Alaska, four of which are in the U. S. National Museum, cat. no. 208433. One of these, the type, measures; greater diameter 0.85 mm., lesser diameter 0.7 mm., altitude 0.4 mm. The remaining eight specimens are in Dr. Baker's collection.

ALVANIA BAKERI, new species. Pl. XI, fig. 8.

Shell minute, bluish white. Nuclear whorls one and one-third, forming a moderately elevated spire. Upper half of the well-rounded nuclear whorls marked by about ten very fine closely spaced spiral striations, lower half marked by numerous closely spaced depressed elongate granules, each of which has the long axis decidedly protractively slanted; which lends to this part of the turn a finely blistered appearance. Post-nuclear whorls a little more than two, well rounded, separated by a strongly constricted suture marked by three strong rounded spiral keels of which the strongest is a little anterior to the posterior third between the sutures, while the anterior of the other two, which are of equal strength, is at the periphery and the third halfway between them. In addition to these keels the whorls are marked by fine incised spiral lines between the keels which are best developed on the well-rounded shoulder between the summit of the whorls and the strong keel below it. Base of the last whorl slightly protracted, well rounded, marked by two broad depressed spiral cords of which the basal one which is a little anterior to the middle is the broader. In addition to these are numerous exceedingly fine spiral striations. The axial sculpture of the entire spire and base consists of very fine incremental lines only. Aperture very broadly ovate, almost circular, peritreme continuous, outer lip thick within, beveled at the margin to form a sharp edge which is rendered slightly sinuous by the external spiral sculpture; columella strong and strongly curved, parietal wall of the aperture appressed to the preceding whorl.

The type, cat. no. 208445 U. S. N. M., was collected by Dr. Fred Baker at Port Graham, Alaska. It measures; length 1.4 mm., diameter 1.2 mm.

ONOBA ASSER, new species. Pl. XI, fig. 9.

Shell elongate conic, bluish white, semitranslucent. Nuclear whorls one and one-tenth, smooth, a little less elevated than the succeeding turns. Post-nuclear whorls very high between the sutures, overhanging, moderately rounded, appressed at the summit. The preceding whorl shines through the summit of the succeeding turn and gives this the appearance of having a double suture. Sutures well impressed. Periphery of the last whorl well rounded. Base moderately prolonged, well rounded. Entire surface of spire and base marked by closely placed exceedingly fine microscopic spiral striations. Aperture very broadly ovate, posterior angle obtuse, outer lip thin; peritreme complete.

The type, cat. no. 208434 U. S. N. M., was collected by Dr. Fred Baker at Fort Graham, Alaska. It has four and a half whorls and measures: length 2.2 mm., diameter .9 mm. This species is nearest related to *Onoba cerinella* Dall, from which it is distinguished by its lesser size and more delicate structure.

ODOSTOMIA (EVALEA) COOKEANA, new species. Pl. XI, fig. 7.

Shell elongate ovate, very narrowly umbilicated, yellowish white. Nuclear whorls very obliquely immersed in the first of the succeeding turns. Post-nuclear whorls very high between the sutures where they are very moderately rounded and marked by rather strong incremental lines and very numerous fine spiral striations. Periphery and base of the last whorl somewhat inflated, the latter strongly rounded and marked like the spire. Aperture large, oval; posterior angle acute; outer lip thin; columella decidedly oblique, quite strongly curved in the middle and somewhat reflected, provided with an oblique fold at its insertion which is strong within and tapers to a vanishing point at the free edge of the columella; parietal wall glazed with a thin callus.

Two specimens of this species were collected by Dr. Baker at Ellamar, Alaska. One of these, an immature specimen, furnished our description of the nucleus, the other, cat. no. 208427 U. S. N. M., gave the adult characters. The adult specimen has its nucleus badly eroded. The four remaining whorls measure: length 3.2 mm., diameter 2.0 mm. The young individual which is in Dr. Baker's collection has $3\frac{1}{2}$ whorls and measures: length 2.3 mm., diameter 1.4 mm.

Named for Miss J. M. Cooke of San Diego at the request of Dr. Baker.

THE SYSTEMATIC POSITION OF THE UNIONID-GENUS PARREYSIA.

BY A. E. ORTMANN.

In NAUTILUS, vol. 22, Feb. '09 p. 107, Frierson reports that in *Parreysia* all *four* gills serve as *marsupium* in the gravid female, a character which does not agree with Simpson's definition of the subfamily *Hyriinæ* (*Hyrianæ*). He concludes that, in this instance, we should not pay attention to the marsupial character, but should rely upon the radial sculpture of the beaks of the shell.

Recently I received a number of these *Parreysias* through the courtesy of Mr. Frierson, and I am much obliged to him for giving me the opportunity to examine them. I should call the species *Parreysia wynegungaensis* (Lea) although a number among them distinctly incline toward *P. corrugata* (Muell.) There are 30 of them, 13 males, 11 sterile, and 6 gravid females; none of the latter had glochidia, but only eggs in various stages of development. There was no sex differentiation whatever in the shells.

An examination of the soft parts revealed the fact, that not only all four gills are marsupial in the female, but that *the whole structure of the soft parts is absolutely like the North American Quadrula* (see: Ortmann, in: NAUTILUS, 23, Feb. '10 p. 116). The only, and unimportant, differences are, that the *supraanal opening* is rather widely separated from the anal, and that the *inner lamina of the inner gill* is entirely connected with the abdominal sac. For the rest, all other characters are like *Quadrula*, and the most prominent features are the following.

The inner edge of the anal opening is finely crenulated; that of the branchial opening is papillose, and rather well defined anteriorly; in front of the latter, there are fine crenulations on the inner mantle-edge for a short distance, but no special structures, such as papillæ or flaps. The gills are unequal, the outer considerably smaller than the inner. The diaphragm is normal, and the outer lamella of the outer gill is connected with the mantle to the posterior end. In the male, there are *well developed water tubes* in the gills, but they are rather wide, and the septa separating them are far apart. In both, the male and female, the edge of the inner gill possesses a longitudinal furrow, which is absent in the outer gill. In the female, *all four gills serve as marsupium*, and possess the structure of marsupial gills; the water tubes are narrow, and the septa are close together

(in the outer gill closer than in the inner). The septa show, in the sterile female, in both gills the characteristic folded epithelium. When gravid, all four gills swell but *only moderately, and the edges always remain sharp*, and do not possess the faculty of distending. The water tubes (ovisacs) *remain simple*, and in each of them the eggs form a subcylindrical, only slightly compressed, mass, a placenta, which, however, is not very solid, the mutual adhesion of the eggs being rather slight.

With the exception of the two features mentioned above, *Parreysia* is thus identical, in its anatomy, with *Quadrula*. If we add to these two differences the radial sculpture of the beaks, we would have good generic characters. But the genus, at any rate the species *wynegungaensis* which stands close to the type species of the genus, *corrugata*, should be removed from the subfamily *Hyriinæ*, and placed into the subfamily *Unioninæ* (NAUTILUS, 23, '10 p. 116), by the side of, and close to *Quadrula*. The definition of the *Unioninæ* should be slightly modified with regard to the supraanal opening and the inner lamina of the inner gills, so as to include *Parreysia*, but these modifications are irrelevant.

This, of course, means that I do not attribute any significance to the beak sculpture, but I think I am fully justified in this. If we make radial beak sculpture the prime character of the *Hyriinæ*, we would be compelled not only to unite the Afro-Asiatic forms, like *Parreysia*, with the South American *Hyriinæ*, which, I believe, is a great mistake, but we would also have to unite with the *Hyriinæ* a number of *living North American* shells. For we must not forget (and this is a fact generally overlooked) *that we have radial (zig-zag) beak sculpture in a number of species of Quadrula.* I name the following: *Quodrula (Rotundaria) tuberculata* (Raf.), *Qu. infucata* (Conr.) and *kleiniana* (Lea), *Qu. lachrymosa* (Lea), *forsheyi* (Lea), *speciosa* (Lea), *apiculata* (Say). Also in *Qu. cylindrica* (Say) traces may be seen. This zig-zag radial sculpture is best developed in the species first named; in the others it goes generally as "double-looped," but, in my opinion, the so-called "double-looped" sculpture is but the last remnant of the zig-zag sculpture.

Furthermore, *radial beak sculpture is a quite frequent feature in North American fossil Unionidæ* from the Mesozoic era. If we look at the beak sculpture of *Unio holmesianus* White (see: 3 Ann. Rep. U. S. Geol. Surv. '83, pl. 16, fig. 2–6) from the Laramie of southern

Wyoming; or at the beak sculpture of a number of species described by Whitfield from the Laramie of Montana (see: Bull. Amer. Mus., N. H. 19, '03 p. 483 and 23, '07 p. 623), we cannot deny, that we have here a beak sculpture corresponding very closely to the "radial" sculpture of certain Asiatic types. This is especially true in: *U. retusoides* Whitf. ('03, pl. 38, fig. 6), *U. browni* Whitf. (*ibid.* pl. 38, fig. 3), *U. percorrugatus* Whitf. (*ibid.* pl. 40, figs. 3, 4), and *U. pyramidatoides* Whitf. ('07, pl. 41, fig. 1), *U. letsoni* Whitf. (*ibid.* pl. 42, figs. 1–3). I have, fortunately, a number of specimens before me, coming from the same general region as Whitfield's material; they were collected for the Carnegie Museum at Hell Creek, Dawson Co., Montana, and show the beak sculpture beautifully in *U. retusoides*, *browni*, *pyramidatoides*, *letsoni*, and in addition it is distinctly seen in specimens of *U. verrucosiformis* Whitf. ('07, pl. 42, fig. 5). Some of these fossil forms undoubtedly are the ancestors of modern species, as is sometimes expressed in their names (but not always correctly; *pyramidatoides* has nothing to do with *Qu. pyramidata*, but belongs clearly to the *trigona*-type). Thus it is evident that many North American *Unionidæ once had radial beak sculpture, and some have preserved traces of it up to the present time.* This character probably once was more generally distributed, and remains rather well preserved in many old world forms (and also in South American groups), but in North America it has become more and more *obliterated.* Such a character, of course, although fit to indicate genetic relationship, is unfit to be used as a principle for classification.

The structure of the soft parts, which indicates close relationship between *Quadrula* and *Parreysia*, is much more reliable, in fact according to my experience, is *absolutely* reliable. In this connection it should be mentioned that in one of our gravid *Parreysias* only the outer gills were filled with eggs; but microscopical investigation showed that also the inner gills had the typical structure of the female marsupial gill, and that, in this instance, the specimen was just in the beginning of the period of gravidity, and the inner gills were *not yet* charged. Similar cases might sometimes lead to mistakes, if investigated only superficially.

Of course, we now stand before the task of redefining the subfamily *Hyriinæ* according to the South American typical representatives, and to investigate additional so-called *Hyriinæ* from Asia and

Africa. I hope to be able to contribute to the solution of the first question in the future, since the Carnegie Mrseum recently has received a good deal of alcoholic material of South American *Unionidæ*, which is waiting for identification and examination.

NEW SPECIES OF SPHAERIIDAE.

BY V. STERKI.

Sphærium lineatum, n. sp.

Mussel somewhat elongate, inequipartite, well inflated; beaks somewhat anterior, rather large, full, rounded, projecting over the hinge margin; superior and inferior margins moderately and regularly curved, anterior and posterior subtruncate-rounded, oblique; scutum and scutellum distinctly marked, narrow; surface dullish with a slight silky glass, with the concentric striæ (sulci) fine, sharp, crowded, regular, and several (3 or 4 to 7) strongly marked, dark lines of growth; color grayish-horn to reddish, the latter prevalent on the beaks and upper part of older specimens; shell rather thin, hinge slight, long, plate narrow; cardinal teeth small; slight, short, the right curved or angular, emarginate, its posterior part bifid, the left anterior rudimentary or wanting in some specimens;[1] ligament long, slight covered.

Long. 15.5, alt. 11.5, diam. 8. mill. (Turkey Lake).

Long. 14, alt. 10.5, diam. 8. 5 mill. (Wetherby).

Soft parts not seen.

Hab.: Turkey Lake, Kosciusko Co., Indiana, collected by Mr. L. E. Daniels, of the Indiana Geological Survey, in 1902.

A Sph. from Mountain Lake, Marquette Co., Michigan (Upper Peninsula), collected by Mr. Bryant Walker, in 1898, and sent for examination then, appeared to be of the same species. The mussel is somewhat smaller, with the beaks slightly more anterior, the inferior margin less curved and the infero-posterior angle somewhat more marked. These Sphæria, although well represented by good specimens of various stages of growth, and regarded as distinct, were shelved for years, in the hope of getting additional material. Lately Mr. Bryant Walker kindly sent me a lot of the Wetherby collection, which unfortunately has no label. Although such specimens should

[1] As occasionally found also in other species.

be considered worthless, the present ones were so manifestly of this same species that they may be regarded as a confirmation of it. They are rather like the Mountain Lake mussels in shape, but somewhat larger, and somewhat more inflated than the Turkey Lake form. It appears that the comparatively numerous, strong, mostly dark lines of growth and the fine (as compared with those of other species), sharp, crowded striæ are characteristic and, combined with surface appearance and color, let specimens be recognized at a glance.

Specimens of the type lot are in the Museum of the Geol. Survey of Indiana and in the Carnegie Museum, Pittsburgh (No. 5465 of my collection of *Sphæriidæ*), in the collection of Mr. Bryant Walker and the Mus. Acad. N. Sc. Phila.

PUBLICATIONS RECEIVED.

Key to the Genera of Gastropoda of Michigan. By H. Burrington Baker. (Reprint from the 11th Rept. Mich. Acad. Sci., 1909, pp. 134–140.)

Descriptions of Nine Species of Ennea and Five Helicoids from South Africa. By James Cosmo Melvill and John Henry Ponsonby. (Ann. Mag. Nat. Hist., vol. 4, ser. 8, pp. 485–492, pl. 7, 1909.)

Report on the Marine Mollusca Obtained by Mr. J. Stanley Gardner, F. R. S., Among the Islands of the Indian Ocean in 1905. By James Cosmo Melvill. (Trans. Linn. Soc. London, XIII, pp. 65–138, pl. 5, 1909.) About 170 species are recorded of which 15 are new to science.

Mollusca from the Hope Islands, North Queensland. By C. Hedley. (Proc. Linn. Soc. N. S. Wales, 1909, vol. 34, pp. 420–466, pls. 36–44.) An interesting paper treating of a rich and varied fauna. The Hope Islands are situated near Cooktown, just inside the Endeavor Reef. The writer states that more than 700 species were secured; 100 species are discussed in this paper, half of which are new to science. The figures are unusually fine in detail and sculpture.

Descriptions of New and Notes on Other Australian Polyplacophora. By C. Hedley and A. F. Basset Hull.

(Records Australian Mus., vol. 7, pp. 260–266, pls. 73 and 74, 1909.) Four species are described as new.

A Revised census of the Terrestrial Mollusca of Tasmania. By W. F. Petterd and C. Hedley. (Records Australian Museum, vol. 7, pp. 283–304, pls. 82–87, 1909.) A complete revision of the species, with illustrations of all Tasmanian land shells hitherto unfigured. *Cystopelta bicolor* is described.

The list of San Bernardino County mollusks in the November number of The Nautilus (Vol. XXIII, pp. 73–79) does not include *Lymnæa bulimoides techella* Hald. I found this species in considerable numbers during the summer of 1909, in Sec. 33, Tp. 2 S., R. 7 W., very near the county line, but the owner assures me that his property is in San Bernardino County. They were in a pond surrounding an artesian well. Dr. Frank C. Baker identified the specimens.—Junius Henderson, *Boulder, Colo.*

Note on the Summary of the Mollusca of the Peruvian Province.—There are some points in Mr. Berry's review of this paper which show that even those things which are obvious, or seem to be so, should not be omitted. In preparing this list it was not my intention to review the whole molluscan classification or nomenclature, which would have taken as many years as the list I prepared took months. In those groups which are not familiar to me, I fell back on the only modern classified lists of the Cephalopods and Nudibranchs, namely those of Hoyle and Bergh, as indicated in my bibliography; the experience and reputation of these authors being such as to require no apology for accepting their results. In the case of the *Bolitæna* I followed the spelling of the name as given in the work referred to, the Bulletin of the Museum of Comparative Zoology. *Polypus fontaineanus* was named after N. Fontaine, and though it happened to be misprinted *fontanianus* in the first fasciculus of Orbigny's work, and this misprint was copied on the plate by the engraver, the error was corrected in the index of the book somewhat later. Under these circumstances we are authorized by the rules to accept the correction, as Mr. Berry proposes to do in the case of *Turridæ*. However in the latter case since the derivatives of *Turris* in Latin (*turritus*) English (*turrited*) and so far as I know all other languages, accept the euphonic "t" in derivatives of *Turris*, I kept the earlier form which is more in harmony with *Turritellidæ* and similar accepted locutions. The illustrations of the work were intended for those interested in the identification of the economic shellfish and not for anatomists, and for this purpose Orbigny's plates are quite satisfactory. As Whewell remarked "We are none of us infallible, not even the youngest of us."—*Wm. H. Dall.*

QL
401
N25
v.22-23

Nautilus

Biological
& Medical
Serials

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY